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Detailed case studies of each of the 5 school district participating in an evaluation of compensatory education (CE) programs under Title I of the Elementary and Secondary Education Act of 1965 are contained in this volume. Technical features and the methodology used in the 1965-66 and 1966-67 school year programs are described. The description and analysis of each district includes: a description of the district and sample school; types of CE activities; allocation of funds for CE; analysis of trends; distinguishing features of successful CE; characteristics associated with success ; and a summary. Analytical methods, statistical data, and a description of variables are included, in addition to a bibliography. A related document is RC 002 952 .(SW)

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ANALYSIS OF COMPENSATORY EDUCATION IN FIVE SCHOOL DISTRICTS

Volume II: Case Studies

August 1968

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Final Report

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ANALYSES OF COMPENSATORY EDUCATION IN FIVE SCHOOL DISTRICTS

VOLUME II: CASE STUDIES

68TMP-93(II)

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Washington, D.C. 20005

16 August 1968

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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PREFACE

This is a report on the work done by the General Electric Company —TEMPO under contracts HEW-05-67-55 (A Survey and Preliminary Cost-Benefit Analysis in Elementary and Secondary Education) and OEC-D-8-08042-3513 (Analyses of Compensatory Education within Schools from Five Major School Districts). Detailed findings of the first study are described in an earlier TEMPO report, Survey and Analysis of Results from Title I for Compensatory Education, 1 March 1968, available through the U.S. Department of Health, Education, and Welfare, Office of Education.

Volume I of this report summarizes the results of both research efforts. Sections 1, 2, and 3 of Volume I, which describe the overall Phase II effort, were prepared by E. J. Mosbaek of TEMPO. Section 4 of Volume I is a synopsis of the Phase I effort. Most of this section was written by Bayla White of DHEW. The basic data for the study were collected by joint teams of DHEW, OE, and TEMPO personnel. Some of these data appear in Section 5 of Volume I.

Volume II gives the detailed results from the case study of each of the five school districts included in the Phase II effort and describes the technical features of the methodology used. Volume II was prepared by F. R. Frola, K. F. Gordon, J. W. Harrison, and E. J. Mosbaek, all of whom are TEMPO staff members.

The effort and critical comments from personnel in local districts as well as personnel from DHEW and OE were crucial in carrying out this research. It has been agreed that none of the sample schools or school districts will be identified in the results reported.

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APPENDIX 1

DESCRIPTION AND ANALYSIS OF DISTRICT 13

A. SUMMARY

The analysis of District 13 involved seven of the 24 public elementary schools participating in the Title I program. Within these seven schools, there were approximately 2,100 pupils in each year in the 28 grade units included in the sample.

A major finding was that the 28 sample grade units experienced a significant average change in achievement from 1965-66 to 1966-67. Although the change cannot be positively attributed to CE, it does appear the most plausible reason for the improvement. The increase over that which would be expected in the absence of CE was approximately 1 to 2 grade equivalent months, which suggests that on the average pupils increased their achievement level 15 percent to 25 percent more than they would have without CE. For example, if a pupil could have been expected to gain 7 or 8 grade-equivalent months during the year between the 1965-66 and 1966-67 tests without CE, the observed 1 to 2 months' difference would mean a 15 percent to 25 percent larger gain.

There does appear to have been a downward trend in grade 6 scores during the 3 years prior to 1966-67 tests that would warrant a small upward adjustment on the net effect of CE. However, the school officials in District 13 felt strongly that there was not sufficient evidence for establishing a trend. Because of this and because the indicated amount or adjustment would have been too small to affect the major conclusions on the district, the unadjusted data on change in achievement were used.

The preachievement level appears to be the only variable that is highly correlated with change in achievement. The regression coefficients suggest that pupils in grades with the lowest relative preachievement level improved the most.

It was not possible to identify particular CE activities that were more successful than others. The district had too many different CE activities and too many sources of variation in results among the 28 observations to allow accurate evaluation of specific, individual activities.

The data on expenditures for CE and regular classroom teachers show large variation among grades and among schools. This suggests that expenditures for both CE and regular programs at the grade level should be identified and included in any evaluation of the effects of CE.

B. DESCRIPTION OF DISTRICT AND SAMPLE SCHOOLS

There are approximately 150 public schools with a total enrollment of about 122,000 pupils in District 13. In addition, there are approximately 14,000 pupils enrolled in private schools. For 1965-66, there were 23 public elementary and nine public secondary, continuation, or adjustment schools with an enrollment of some 25,000 pupils, and four elementary and one secondary parochial schools with a total of 2,000 pupils participating in Title I programs. For the 1966-67 year one public elementary and one public secondary school were added to the Title I program. The public schools served census tracts in which 7 to 22 percent of the families reported incomes under $2,000 in 1959.

This analysis involved 28 grade units in seven of the 23 public elementary schools. Data on the following school and pupil characteristics were examined: percentage of eligible pupils, percentage of Negro pupils, percentage of Spanish-speaking pupils, school enrollment, numbers of instructional personnel, and pupil mobility. Insofar as possible, schools were selected to represent a wide range of these characteristics in order to determine whether relationships exist between the outcomes of CE activities and characteristics of the recipient pupil population. These characteristics are summarized in Table 1.

Achievement data were obtained from the regular testing program in the district. The type of test and date it was given for each of the grades in the sample are shown in Table 2.

Table 1. Sample school characteristics, 1965-66—District 13.

School Characteristics	School Number						
	1	2	3	4	5	6	7
Average Enrollment	825	601	546	851	423	830	821
Pupil Mobility (%)[a]	79	77	61	56	39	78	56
Negro Pupils (%)	8	24	56	80	11	44	91
Spanish-Speaking Pupils (%)	14	21	11	12	84	40	7
Percentage of Pupils From Families With Income Under $2000/yr in 1959	8	10	12	12	18	19	19

Note:

[a] Number of pupils who entered a school plus number who withdrew from a school expressed as a percentage of average daily membership for the year.

Some comparison between the pupils in Title I schools and all pupils in District 13 can be obtained from the data in Table 3. The three grades for which data are available show all four measures of achievement for the entire district as slightly above the national norms, whereas in Title I schools all four measures are substantially below the national norms.

Table 2. Testing program for grades and schools included in sample—District 13.

Grade	Test and Subtest	Form Used		Month Tested	
		Pre	Post	Pre	Post
1	SAT Paragraph Meaning	Pri. 1-W	Pri. 1-W	May	May
2	SAT Paragraph Meaning	Pri. 11-W	Pri. 11-W	May	May
5	STEP Reading	4A	4A	Oct.	Oct.
6	SAT Paragraph Meaning	Int. KM	Int. 11-W	Jan.	Oct.

C. TYPES OF CE ACTIVITIES

Compensatory education in School District 13 consists primarily of the comprehensive program funded under Title I, ESEA supplemented by other federal, state, and local CE activities. For the 1965-66 and 1966-67 school years, 26 activities* were organized into the groups of activities and budgets shown in Table 4.

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* The district reported 37 CE activities, but TEMPO combined several small activities and excluded some because they did not pertain to sample schools.

Table 3. 1965 test results by total district and total Title I schools (national percentile rank scores)—District 13.

Grade 5	District (8691 Pupils)				ESEA Schools (1490 Pupils)			
	Mean	Median	Lower Quartile	Upper Quartile	Mean	Median	Lower Quartile	Upper Quartile
Reading	56%	60%	37%	81%	39%	39%	21%	60%
Writing	59	58	33	80	41	35	22	57
Mathematics	61	60	37	81	43	37	21	58
Scholastic Ability (IQ)	106	105	95	116	96	95	86	104
Grade 8	**District (7965 Pupils)**				**ESEA Schools (1463 Pupils)**			
Read. Comp.	60	64	34	89	37	38	14	66
Vocabulary	72	74	41	92	45	43	15	74
Spelling	63	61	28	86	41	42	16	71
Language	56	59	28	85	31	30	9	57
Arith. Reas.	55	51	24	81	31	30	13	58
Arith. Comp.	46	38	14	76	23	18	5	49
Scholastic Ability (IQ)	103	104	92	113	94	93	84	104
Grade 11	**District (7083 Pupils)**				**ESEA Schools (1560 Pupils)**			
Soc. St. Bkg.	68	68	36	86	51	44	25	74
Science Bkg.	61	63	37	86	44	42	23	74
English Bkg.	53	52	30	76	40	39	22	65
Math.	65	62	36	82	49	43	22	63
Soc. St. Read.	61	60	38	82	47	44	19	63
Science Read.	61	59	38	81	45	42	26	61
Eng. Read.	58	58	34	84	42	41	19	64
Vocabulary	64	64	40	84	44	44	24	71
Composite	64	64	40	84	47	43	23	67
Study Skills	60	62	32	83	41	37	20	64
Scholastic Ability (IQ)	104	102	95	110	97	96	89	103

Table 4. Title I project budgets for four main groups of CE activities—District 13.[a]

Project	1965-66	1966-67
Pre-kindergarten	$ 243,000	$ 0
Remedial and Corrective Skills	1,075,000	911,000
Cultural Enrichment	486,000	79,000
Auxiliary and Supportive Ser.	668,000	994,000
Overhead and Fixed Charges	130,000	227,000
TOTALS	$2,602,000	$2,211,000

Note:

[a] Data were obtained from District CE plans of December 1965 and July 1966 and from the 1966-67 Title I budget status report of June 1967.

The list and extent of the CE activities within each of the major groups is given in Table 5. The district has pursued a wide range of CE activities, some preceding and others in addition to those made possible by Title I. The following paragraphs supplement the data given in Table 5 on District 13's CE activities.

Remedial and Corrective Basic Skills Activities (Group 1)

PRIMARY REMEDIAL READING (A). For a number of years prior to Title I, District 13 carried on a program to provide remedial reading assistance to children in grades 2 and 3 who are of average or better-than-average ability, but who are underachievers. Under the regular District 13 program which operates in all district elementary schools, specially trained remedial reading teachers come into the school to work with children identified as having problems in reading.

The regular school year is divided into four equal periods (9 weeks each) and reading teachers are assigned on a half-day basis. Children participating in the program work in groups of 10 with the reading teacher for one period each day in addition to their regular

Table 5. Activities in District 13 Title I program.

Short Title and Description	Expenditures ($1,000)		Target Group	
	1965-66	1966-67	1965-66	1966-67
Group 1 - Remedial and Corrective Basic Skills Activities				
A. Primary Remedial Reading. For underachieving pupils with average ability.		132		Approx. 1,400 pupils in grades 1-4, all Title I schools.
B. Reading Adjustment Classes. For pupils of average or better intelligence at least 2 years retarded in reading achievement.	25	39	Grades 7-8, 3 schools	Grades 7-8, 3 schools
C. Remedial Reading. For pupils who need less help than the reading adjustment CE activity.	86	148	Grades 7-12, all Title I schools	Grades 7-12, all Title I schools
D. English as a Second Language. For pupils from homes where little or no English is spoken.	129	129	72 elem. and 165 sec. pupils, all grades	Approx. 80 elem. and 100 sec. pupils, all grades

APPENDIX 1

Table 5. (continued)

Short Title and Description	Expenditures ($1,000)		Target Group	
	1965-66	1966-67	1965-66	1966-67
Group 1 (continued)				
E. Classes for Educationally Handicapped. More attention to pupils of average or higher ability but retarded in basic skills.	73	72	84 pupils, grades 3-6	111 pupils, grades 3-6
F. Reading Center. For identifying and reducing problems that cause severe and prolonged reading disability.			24 pupils, grades 4-6	33 pupils, grades 4-6
G. Small Group Instruction. For reducing class size.	76	139	Grades 7-12, 3 jr. and 3 sr. high schools	Grades 7-12, 3 jr. and 3 sr. high schools
H. On-Site Resource Teachers. For improving quality of instruction.	180	294	Grades 7-12	Grades 7-12
I. Audio-Visual Equipment. For CE activity groups 1, 2, and 3.	255	14	Target area schools	Mostly sec. schools
J. Improved Instruction in Remedial and Correlative Basic Skills.	22 (+4 in summer of 1966)	1	Target area schools	Mostly sec. schools
K. Physical Facilities. For remedial and corrective development activities.	203 elem. 147 sec.		Target area schools	Target area schools

Table 5. (continued)

Short Title and Description	Expenditures ($1,000)		Target Group	
	1965-66	1966-67	1965-66	1966-67
Group 2 - Cultural Enrichment Activities (Except capital outlays)				
L. Cultural Enrichment.	74	54	Target area schools	Target area schools
M. Classes for More Able Pupils. To aid pupils with an IQ of 120 or higher.	17	9	Grades 3-6, target area	230 pupils, grades 3-6, target area
N. Increased Library Services. To provide more staff and books.	36	54	Target area schools	Target area schools
Group 3 - Auxiliary and Supportive Services Activities				
O. Centralized Activities and Overhead.	2	3		
P. Speech and Hearing Therapy.	9 (est.)	24 (est.)	120 pupils, 2 sr. high schools	259 pupils
Q. Health.	25	25	Target area schools	Target area schools
R. Counseling Activities. To reduce academic, mental, and social problems.	14	29	Target area schools	Target area schools

Table 5. (continued)

Short Title and Description	Expenditures ($1,000)		Target Group	
	1965-66	1966-67	1965-66	1966-67
Group 3 - (continued)				
S. Auxiliary Teacher Service.			Grades 1-6, Title I schools	Grades 1-6, Title I schools
T. Teacher Assistants, Aides, and Clerks.				Title I elem. schools
U. Kindergarten Aides.	44	82	K	K
V. Elementary School Adm. Services.	2	13	Title I schools	Title I schools
W. Extended Time and Training Activities.	28	24	Title I schools	Title I schools
Group 4 - Other				
X. Pilot Project. Started in 1963-64.	108		3 elem. and 2 jr. high schools	
Y. State CE Project		280		9 elem. and 1 jr. high school
Z. NDEA Counseling Project.	60			Several secondary schools

classroom work in reading. In theory, a child participates in the program for 9 weeks, returns to his classroom for 9 weeks, then receives 9 more weeks of remedial help if he still needs it.

With the addition of Title I funds, six new remedial reading teachers were added to provide additional service to the Title I target schools (public and parochial). During the first semester of Title I (February-June 1966), the semester was divided into three equal parts (6 weeks each) and ESEA teachers assigned to provide additional service to the target schools.

Under the Title I program, pupils in grades 1 through 4 could receive remedial help. It was left to the discretion of the individual school to decide which students in which grades should participate in the program. During the 1966-67 school year a state-funded program provided money to hire additional teachers for this remedial reading program. These teachers, however, were not assigned to target area schools, but to other schools in the district.

READING ADJUSTMENT CLASSES (B). To help students in grades 7 and 8 who have average or better intelligence but whose reading achievement is at least 2 years retarded. Reading problems were diagnosed and pupils placed in groups of eight under two teachers with special training or experience. Teacher aides and additional equipment were provided. Title I funds supported this project in three schools. This activity was planned as a replacement for adjustment English or regular English, except for a few pupils for whom it was a seventh period class.

REMEDIAL READING (C). Similar to the above project, to meet needs of pupils in grades 7 through 12 with lesser reading retardation, in groups of 15 to 18 pupils. Already a district-supported project, Title I funds provided additional classes in six schools.

ENGLISH AS A SECOND LANGUAGE (D). To help non-English-speaking pupils to develop fundamental English language skills and to prepare them for regular school programs. An aural-lingual approach was used at beginning, intermediate, and advanced instructional levels. Classes of 18 pupils were provided with a teacher aide or assistant, tutors, materials, and equipment. Some portable classrooms were obtained. This was an expansion of an existing project.

APPENDIX 1

CLASSES FOR EDUCATIONALLY HANDICAPPED PUPILS (E). A remediation project to provide more attention to problems of academically handicapped pupils of average or greater ability but retarded in basic skills. Small groups of pupils (15 to 20) in elementary grades were assigned to a teacher on a full-day schedule. A resource teacher, materials, in-service training, and portable classrooms were provided. Title I funds enlarged an existing activity.

READING CLINIC AND READING DEVELOPMENT CENTER (F). For a number of years School District 13 has operated a summer reading clinic and a year-round reading center, both of which have been effective in diagnosing children's reading problems and recommending and initiating remediation. Although children of the target area schools were eligible for this reading center, few attended because it was located in another part of the city. To serve these children, many of whom are handicapped by language problems, it was desirable to locate similar reading clinics in their neighborhoods. The summer reading clinic is composed of 10 teachers assigned to one elementary school site under the direction of a principal trained in the diagnosis and treatment of severe reading problems. A nurse, visiting teachers, psychologist, and speech therapist support the instructional program.

The primary purpose of the summer reading clinic is to identify the sources of individual children's reading problems and to recommend the necessary remediation, some of which is initiated during the 6-week summer session, but most of which is carried on in the year-round center. Intensive reading instruction is given in small classes, with emphasis on individual help.

The year-round reading center provides specialized reading instruction on an individual basis to children who are severely retarded in reading achievement owing to one or more causes. The reading center was planned with a staff of three teachers, each of whom work with no more than 12 students at a time.

The new reading centers required construction of portable bungalows, purchase of reading equipment items such as reading pacers and tachistoscopes, and use of individualized reading devices as instructional aids. A guide was written to assist teachers participating in this activity.

Although this activity is described as planned for grades 4 through 6, enrollment in the spring of 1966 was for grades 3, 4, and 5. The program was conducted at sample School 6 to which eligible children from other schools had been transferred during academic year 1965-66.

SMALL GROUP INSTRUCTION (G). In order to reduce class size in secondary schools the following actions were taken:

1. Ten English teachers were added in target area schools to reduce the English teacher load.
2. Readers were provided for English classes to allow the teacher more time for diagnostic periods.
3. Master teachers were identified and used within department teaching areas. The use of 12 teaching teams made possible small group instruction and extended the talents of a master teacher to a greater number of students. The team leaders received additive pay.
4. Clerical assistance, office equipment, and supplies for the additional tasks taken on by schools participating in this activity were provided.
5. Teacher assistants were provided to help in the classroom with supervisory and clerical responsibility, giving the teacher more time for small group instruction.

A number of connecting doors were installed between rooms in each of the schools to link together several classrooms for large group instruction under the team-teaching plan. Small group instruction areas were created through the construction of partitions. Independent study areas for students were developed in each of the target area schools through the installation of partitions. Office space for the clerical staff was provided through the remodeling of existing facilities.

This activity is similar to that called Auxiliary Teacher Service at the elementary level.

ON-SITE RESOURCE TEACHERS (H). Resource teachers were recruited for each school to teach two or three periods a day as team leaders with other teachers on the team and use the remaining time to work with other members of the teaching staff on improvement of the total instructional program.

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Tasks of the on-site resource teachers include:

1. Helping teachers improve overall instruction,
2. Developing needed instructional material,
3. Helping to lead the school's in-service program,
4. Giving demonstration lessons,
5. Creating liaison with district resource personnel,
6. Leading in development of team teaching and staff utilization.

Teacher aides and assistants were used to relieve teachers of some noninstructional tasks, especially those connected with team teaching. Certificated personnel would therefore have more time to work with small groups.

AUDIO-VISUAL AND OTHER EQUIPMENT (I). Equipment such as projectors, record players, tape recorders, and filmstrip viewers were provided in quantities large enough for effective use in target area schools to broaden culturally deprived children's experience and stimulate oral and written skills. Maps, globes, and films were also provided to assist in imparting geographical concepts. Films on a number of topics were obtained as basic teaching material.

IMPROVING INSTRUCTION IN REMEDIAL AND CORRECTIVE BASIC SKILLS (J). A number of services were provided for teachers to make instruction of disadvantaged children more effective. These included resource personnel, instructional materials, and audio-visual and other equipment, classes dealing with the motivation of culturally deprived or educationally handicapped children, and workshops for teachers to exchange ideas concerning teaching methods. Consultants and specialists were brought in to assist with this function.

REMEDIAL AND CORRECTIVE DEVELOPMENT PROJECT PHYSICAL FACILITIES (K). In School District 13's plan for compensatory education, capital outlay for remodeling and for construction and moving of elementary portables was described as portions of various functional activities. However, accounting information about these facilities is kept as a single item. Therefore, the capital outlay features of the remedial and corrective project are treated within this study separately from the program activities in which they were described. The budget for the first year of Title I lists three kinds of items under physical facilities: remodeling, construction and moving of portables, and room darkening.

The portables include 15 at the elementary level and six at the secondary level (there were, in addition, nine others scheduled for kindergartens). The "room darkening" item (mentioned but not included in the expenditures for the audio-visual equipment activity) includes blinds and drapes for use in audio-visual facilities. In 1966-67 essentially no funds were budgeted for physical facilities of these types. Benefits from physical facilities are expected to lag considerably behind the time when funds are budgeted. For the total of 30 portable classrooms for which a contract was let for construction and moving, only 70 percent of the expenditures occurred in 1965-66. The "move-in" dates specified in the contract range from July 1966 to September 1966. Therefore, there were no pupil benefits from these classrooms prior to academic 1966-67.

Cultural Enrichment Activities (Group 2)

CULTURAL ENRICHMENT (L). A number of activities were provided to motivate and stimulate elementary and secondary pupils of disadvantaged areas, including art and music classes, enriched summer session and Saturday classes for talented pupils, assembly programs and cultural exchange, study trips, oral communications skills festival, equipment for remedial use and cultural enrichment in business education, and equipment for instruction in home management and personal development.

CLASSES FOR MORE ABLE PUPILS (M). More able pupils in grades 3 through 6 were grouped into an enriched and accelerated program in four centers. A resource teacher, field trips, visiting teachers, special equipment, and in-service training were provided.

INCREASED LIBRARY SERVICES (N). Title I funds were used to expand a modest district program to provide and equip libraries in elementary schools and secondary target area schools and to provide personnel for greater library availability.

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Auxiliary and Supportive Services Activities (Group 3)

CENTRAL ACTIVITIES AND OVERHEAD (O). Two projects were defined to provide for centralized district office services and facilities. One described capital outlay for remodeling, construction, or relocation of portable classrooms. The other provided funds for administrative and supportive services of central offices which were necessary for the management, coordination, and evaluation of the overall CE program.

HEALTH SERVICES (P and Q). Speech and hearing teachers were hired to increase speech and hearing therapy in Title I schools. Additional nurses and a clerk were added to increase nursing time provided at Title I schools.

COUNSELING ACTIVITIES (R). Five program activities provided additional professional or clerical personnel and materials to intensify counseling toward solving academic, mental, or social problems of pupils and parents.

AUXILIARY TEACHER SERVICES (S). After a pilot project, additional teachers were appointed to assist classroom teachers by substituting for the regular teacher to permit small group instruction, lesson planning, providing remedial reading instruction to individual pupils or small groups, serving in the library, conferring with parents, and assisting in school/parent/community activities.

TEACHER ASSISTANTS, AIDES, AND CLERKS (T). Assistants, aides, and clerks were provided in selected secondary and elementary target schools to relieve teachers of noninstructional classroom duties or clerical work and to permit more individualized instruction.

KINDERGARTEN AIDES (U). After a successful pilot project, parent helpers were employed as teacher aides to alleviate some of the problems of overcrowded classes in project schools. They helped to prepare instructional materials, to improve the classroom environment, and to supervise classroom and playground activities.

ELEMENTARY SCHOOL ADMINISTRATIVE SERVICES (V). Vice principals were appointed in target area elementary schools to strengthen administration and permit the principal to devote more attention to curriculum development.

EXTENDED TIME AND TRAINING ACTIVITIES (W). Three program activities provided for orientation and in-service training of new teachers and for continuing professional advancement through conferences, courses, and workshops.

Other Activities (Group 4)

1963-64 PILOT PROJECT (X). A pilot project was initiated in 1963-64 in three elementary and two junior high schools to improve communication skills and motivation, to aid pupils in understanding their abilities, to strengthen teacher understanding of pupils' problems, to improve school relations with parents, and to provide preschool experiences.

STATE CE PROJECT (Y). In 1966-67, a state-district supported project was pursued in nine elementary schools and one secondary school to reduce pupil-teacher ratios and to obtain portable classrooms. A demonstration reading program was initiated in one junior high school.

NDEA COUNSELING PROJECT (Z). During 1964-65 and 1965-66, a counseling project was supported in several secondary schools by NDEA funds to raise educational and vocational aspirations, to increase home-school contacts, and to motivate pupils to remain in school. Activities included extended individual and group guidance sessions with pupils and a parent participation program.

D. ALLOCATION OF FUNDS FOR CE

School District 13 has specified many different types of CE activities. Some are very small, involving only a few thousand dollars for the entire district and amounting to less than $5 per pupil for the pupils in Title I schools.

Table 6 shows total per-pupil CE expenditures averaged over all pupils in a grade for each of the 28 observations in seven elementary schools. The per-pupil expenditure varies from $4 to $127 in the year preceding the pretest for pupils taking the pretest. It varies from $44 to $355 in the year preceding the posttesting of pupils.

In the year preceding the 1966-67 test, total CE expenditures amounted to increases of between 17 and 110 percent over regular expenditures for teachers. There is considerable variation in the

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Table 6. Average per-pupil expenditures for sample schools by grade— District 13.[a]

Grade	School	Year Preceding 1965-66 Test		Year Preceding 1966-67 Test	
		CE$	Reg $	CE$[b]	Reg $
1	1	4	259	80	257
	2	6	273	133	334
	3	13	253	117	282
	4	61	237	130	250
	5	11	306	259	332
	6	18	268	167	298
	7	34	251	97	330
2	1	4	277	131	263
	2	6	200	186	279
	3	7	270	178	250
	4	96	234	253	251
	5	9	283	355	320
	6	16	261	216	334
	7	57	257	261	414
5	1	36	235	47	208
	2	6	253	44	263
	3	7	209	48	279
	4	110	180	110	213
	5	19	140	82	179
	6	63	159	123	281
	7	65	235	114	205
6	1	17	237	58	228
	2	8	215	47	261
	3	7	225	56	225
	4	113	230	143	213
	5	31	199	81	225
	6	39	187	111	191
	7	127	242	210	266

NOTES:

[a] Expenditures for teachers and aides based on average salary for each throughout the district. The same average was used in both years.

[b] Since grades 1 and 2 were tested in the spring and grades 5 and 6 were tested in the fall, the amount of CE expenditures reflects a longer exposure to CE for the lower grades.

per-pupil expenditures for regular classroom teachers, but this bears no apparent relationship to variation in CE.

Tables 7 through 10 show the average per-pupil expenditures for 13 of 26 CE activities listed in Table 5; the amounts spent on many of the activities were negligible when averaged over all the pupils in the grade from which participating pupils came.

In examining the number of pupils in the target groups and expenditures in Table 5, however, we see that per-pupil expenditures for pupils actually enrolled in each CE activity are considerably larger (over $850 per pupil for the Educationally Handicapped activity) than the expenditures in Tables 7 through 10. This is because the figures in the latter tables represent average expenditures for all pupils in the grade and in many cases only a small fraction of the pupils actually participated in CE.

E. ANALYSIS OF TREND

Data for grade 6 presented in Figure 1 indicate a downward trend in the mean and upper quartile during the period 1963-66, but officials in District 13 requested that an adjustment for trend not be made. They felt that it would be necessary to have 10 years of data to develop a reliable trend.

After a discussion with the contract monitors, TEMPO decided not to make an adjustment for trend. However, we suggest that the data shown in Figure 1 do raise the hypothesis of a negative trend. Additional data could be obtained, and the reasons given by District 13 personnel for not making an adjustment could be investigated to determine if they are indeed sufficient evidence for assuming that the observed changes do not represent a trend.

F. DISTINGUISHING FEATURES OF SUCCESSFUL CE

Between 1965-66 and 1966-67 the majority of the grades in the District 13 sample showed a positive change in achievement. As shown in Table 11, the average for all 28 observations was positive and statistically significant. The average change suggests that pupils with approximately 1 year of exposure to CE scored 1 and 2 months higher in grade equivalent score than the pupils 1 year earlier who had very little or no exposure to CE. The positive gain appears more significant in view of some evidence that the achievement level had been decreasing in the few years prior to 1966-67 tests.

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Table 7. Average per-pupil dollar expenditures by CE activity,[a] grade 1—District 13.

CE Activity[b] / School	A	D	E	I	K	L	Q	R	S	T	U	V	W
School 1													
Pupils in 1965-66 Test Results								4					
Pupils in 1966-67 Test Results	11			36	2	3	2	5	11	8	2		2
School 2													
Pupils in 1965-66 Test Results								7					
Pupils in 1966-67 Test Results	8			59	2	5	6	7	35	10	5		2
School 3													
Pupils in 1965-66 Test Results	5							7					
Pupils in 1966-67 Test Results	6			60	2	4	4	9	17	14	3		2
School 4													
Pupils in 1965-66 Test Results			52					4	3	2		2	2
Pupils in 1966-67 Test Results	3		58	29	2	2	5	9	10	8	2	2	2
School 5													
Pupils in 1965-66 Test Results								12					
Pupils in 1966-67 Test Results		34		89	34	6	3	22	29	32	3		3
School 6													
Pupils in 1965-66 Test Results		11						7					
Pupils in 1966-67 Test Results	6	16		42	37	4	7	12	14	20	4	3	2
School 7													
Pupils in 1965-66 Test Results	5		27					4					
Pupils in 1966-67 Test Results	5			65	11	2	2	8	10	23	2	1	2

Notes:

[a] Averaged over all students in grade, whether participants or not. Total for all CE activities is given in Table 6.

[b] The CE activity designated by each letter is identified in Table 5.

Table 8. Average per-pupil dollar expenditures by CE activity,[a] grade 2—District 13

School / CE Activity[b]	A	D	E	I	K	L	N	Q	R	S	T	V	W
School 1													
Pupils in 1965-66 Test Results									4	0			
Pupils in 1966-67 Test Results	26			38	1	7	7	3	5	17	14		1
School 2													
Pupils in 1965-66 Test Results									7				
Pupils in 1966-67 Test Results	28			59	2	11	11	10	7	27	17		2
School 3													
Pupils in 1965-66 Test Results									7				
Pupils in 1966-67 Test Results	14			60	2	10	10	7	9	25	19		2
School 4													
Pupils in 1965-66 Test Results			78						9	7	3		
Pupils in 1966-67 Test Results	27		75	56	2	10	10	11	15	23	20	3	2
School 5													
Pupils in 1965-66 Test Results	14								9				
Pupils in 1966-67 Test Results	44	34		99	34	18	18	8	21	42	33		3
School 6													
Pupils in 1965-66 Test Results		10							6				
Pupils in 1966-67 Test Results	26	15		56	42	8	8	8	11	19	16	2	2
School 7													
Pupils in 1965-66 Test Results			42						11				
Pupils in 1955-67 Test Results				65	25	13	13	10	20	32	27	3	2

Notes:

[a] Averaged over all students in grade, whether participants or not. Total for all CE activities is given in Table 6.

[b] The CE activity designated by each letter is identified in Table 5.

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Table 9. Average per-pupil dollar expenditures by CE activity,[a] grade 5— District 13.

CE Activity[b] School	A	D	E	F	I	K	L	M	N	Q	R	S	T	W	X
School 1															
Pupils in 1965-66 Test Results			28								4				
Pupils in 1966-67 Test Results			12		6	0	4	4		2	4	5	3	1	
School 2															
Pupils in 1965-66 Test Results											6				
Pupils in 1966-67 Test Results	3				6	1	6			3	4	7	3	1	
School 3															
Pupils in 1965-66 Test Results											5				
Pupils in 1966-67 Test Results	3				4	1	7			3	7	4	4	2	
School 4															
Pupils in 1965-66 Test Results			82						3		7	4	3		2
Pupils in 1966-67 Test Results	8		66		5	0	4			2	7	2	4	1	
School 5															
Pupils in 1965-66 Test Results		12									7				
Pupils in 1966-67 Test Results			24		8	2	7			3	10	4	4	2	
School 6															
Pupils in 1965-66 Test Results		5	49								5				
Pupils in 1966-67 Test Results		8	27	53	9	1	4			2		3	4	1	
School 7															
Pupils in 1965-66 Test Results			57								7				
Pupils in 1966-67 Test Results			52	16	9	1	5	9		3	9	4	5	1	

Notes:

[a] Averaged over all students in grade, whether participants or not. Total for all CE activities is given in Table 6.

[b] The CE activity designated by each letter is identified in Table 5.

Table 10. Average per-pupil dollar expenditures by CE activity,[a] grade 6—District 13.

CE Activity[b] / School	A	D	E	F	I	K	L	M	N	Q	R	S	T	W	X
School 1															
Pupils in 1965-66 Test Results			13								4				
Pupils in 1966-67 Test Results			17		12	1	3	7		2	4	4	3	1	
School 2															
Pupils in 1965-66 Test Results											7				
Pupils in 1966-67 Test Results					14	1	7			3	6	7	3	2	
School 3															
Pupils in 1965-66 Test Results											7				
Pupils in 1966-67 Test Results					11	1	4			2	4	5	2	1	
School 4															
Pupils in 1965-66 Test Results			82						1		5	4	2		1
Pupils in 1966-67 Test Results			82		10	1	3			2	5	2	4	1	
School 5															
Pupils in 1965-66 Test Results		13	0								4				
Pupils in 1966-67 Test Results			29		18	2	8			2	11	6	4		
School 6															
Pupils in 1965-66 Test Results		6	2								6				
Pupils in 1966-67 Test Results		2	24	48	11		4			2	7	3	4	1	
School 7															
Pupils in 1965-66 Test Results			120	0							6				
Pupils in 1966-67 Test Results			130	19	18	2				3	9	3	5	2	

Notes:

[a] Averaged over all students in grade, whether participants or not. Total for all CE activities is given in Table 6.

[b] The CE activity designated by each letter is identified in Table 5.

APPENDIX 1

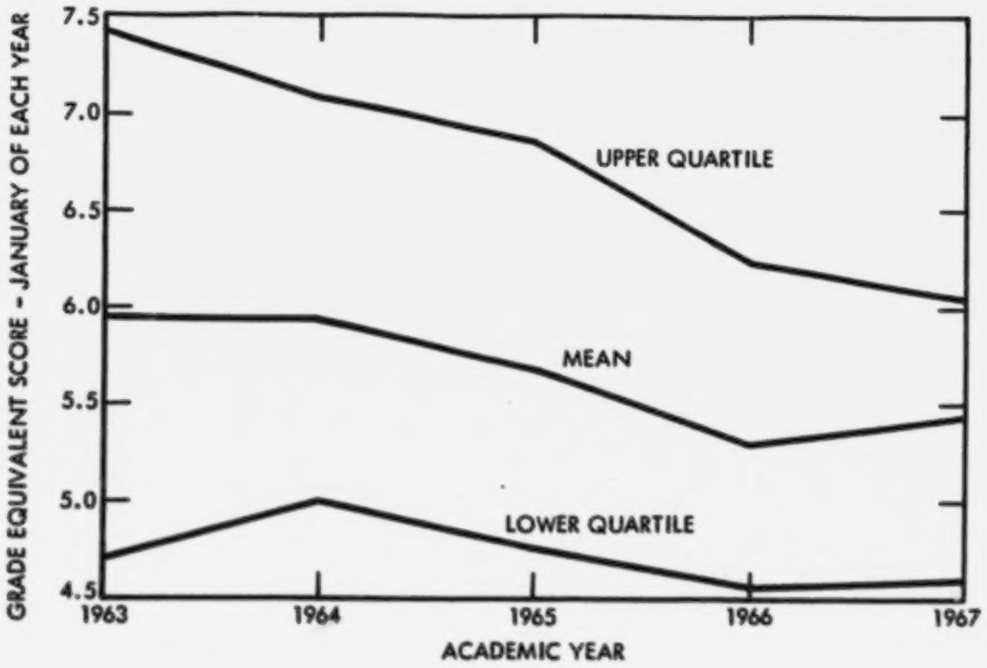

Figure 1. Average reading scores for grade 6 – seven Title 1 schools in District 13.

Table 11. Average change in achievement from 1965-66 to 1966-67 for 28 observations in District 13.[a]

Measure of Achievement	Unweighted Observations[b]			Weighted Observations[c]		
	Average Change	Std. Error	Signif. Level[d]	Average Change	Std. Error	Signif. Level[d]
Δ Mean	1.38	0.47	0.01	1.28	0.44	0.01
Δ Lowest Decile	1.43	0.75	0.10	1.30	0.70	0.10
Δ Lower Quartile	1.03	0.45	0.05			
Δ Higher Quartile	1.84	0.63	0.01			

Notes:

[a] In units of Standard T-scores and based on 2100 pupils in 28 grade units of seven schools.

[b] Simple average of the 28 observations.

[c] Average with each sample observation weighted by the average number of pupils who took the pretests and posttests.

[d] Probability that the observed sample result could have happened by chance if the true change over the test interval was indeed zero.

Although there are considerable data on individual CE activities, there were not enough observations to permit regression analysis of the effect of specific CE activities. Therefore, regression analysis was carried out using total CE expenditures as the only CE variable.

The regression coefficients in Table 12 show the expected change in achievement for a unit change in each of the determining variables. For example, in Model 1 the regression coefficient of -0.428 suggests that a decrease of one standard T-score in preachievement is associated with a change of +0.428 in the mean. Four different models are used for showing how changes in achievement might be explained by changes in both state-of-conditions variables such as preachievement level and resource variables such as expenditures for CE.* Conclusions drawn by TEMPO are based on a summary of the coefficients in all four models since there is no definite way of selecting one model over the others.

The regression coefficients do not show any consistent relationship between change in achievement and expenditures (either CE or regular teachers). Some coefficients are positive and some are negative and most are not significantly different from zero. Although the simple correlation coefficients are predominantly positive, they, like the regression coefficients, are small and not statistically significant. This was the case with respect to all four measures of change in achievement—$\Delta\overline{X}$, ΔD_1, ΔQ_1, and ΔQ_3.

The largest average per-pupil expenditures for any single CE activity are those shown in Table 10 for grade 6, School 7, which lists $120 and $130 per pupil for the "Classes for Educationally Handicapped" activity (column C) in the pre and post periods. The gains in achievement as measured in terms of standard T-scores were impressive with a +5.3 change in the mean and a +4.1 change in the lowest decile. Grades 2 and 5 in School 4 (Tables 8 and 9) had substantial expenditures under the same activity, and again achievement gains were impressive. However, grade 1 in School 4 (Table 7) is a counter example.

The primary remedial reading activity (Column A, Tables 7 through 10) does not show up as a substantial expenditure when expressed as an average over all pupils in a grade. Although the

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* Rationale and description of the models are given in Section C, Appendix 6.

Table 12. Estimated regression coefficients for models described in Appendix 6 – District 13.

Model Number	Dependent Variable	Constant Term	Determining Variables[a]									
			M_i	$(M_i - \overline{M})$	$\overline{X}_i$	$(\overline{X}_i - \overline{\overline{X}})$	ΔAtt	Δ$ R	Δ$ CE	$ F	ΔNeg	R^2
1:	$\Delta\overline{X}$			0.013		-0.428[d]	-0.300		0.006		0.182	0.54[d]
				(0.031)		(0.116)	(0.557)		(0.004)		(0.191)	
	ΔD_1			0.037		-0.426[c]	e	0.019	0.001		0.353	0.26
				(0.055)		(0.218)		(0.015)	(0.008)		(0.361)	
2:	$\Delta\overline{X}$			0.004		-0.440[d]				1.295[b]	0.231	0.52[d]
				(0.029)		(0.114)				(0.695)	(0.184)	
	ΔD_1			0.038		-0.441[c]				1.076	0.270	0.22
				(0.055)		(0.215)				(1.303)	(0.346)	
3:	$\Delta\overline{X}$	22.10	e		-0.496[d]		e	-0.005	-0.002		-0.150	0.51[d]
					0.110			(0.008)	(0.005)		(0.223)	
	ΔD_1	24.24	0.009		-0.536[c]		0.646	0.011	-0.014		-0.174	0.27
			(0.059)		0.222		(1.065)	(0.016)	(0.011)		(0.461)	
4:	$\Delta\overline{X}$	22.63	e		-0.501[d]					-1.238	-0.193	0.52[d]
					(0.102)					(1.105)	(0.224)	
	ΔD_1	21.89	0.031		-0.517[c]					-2.110	-0.261	0.21
			(0.053)		(0.212)					(2.307)	(0.464)	

Notes:

[a] Variables are defined as: $\Delta\overline{X}$, ΔD_1 = Change in mean and lowest decile reading achievement measured in standard T-scores; M_i = % mobility; $(M_i - \overline{M})$ = difference between mobility in school i and sample average for district, ΔAtt=Change in % attendance rate; Δ$R = Change in expenditures for regular teachers; Δ$ CE = Change in expenditures for CE; $F = (Δ$R + Δ$ CE) ÷ ($R pre + $CE pre). For further details, see Appendix 6. The estimate of standard error is shown in parentheses below the respective regression coefficient.

[b] Significant at the 10% confidence level.

[c] Significant at the 5% confidence level.

[d] Significant at the 1% confidence level.

[e] Dropped from the regression estimates because estimated coefficient was very small relative to the estimated standard deviation.

average participant expenditure was $94, the largest expenditure shown in the tables is only $44 per pupil in the post year for grade 2, School 5. The gains of 1.8 in mean achievement and 2.8 at the lowest decile for this grade unit are above the average for the district.

In general, comparison of changes in achievement with the magnitudes of individual CE activities shown in Tables 7 through 10 reveals little information upon which to base firm conclusions. There are too few observations in specific situations to provide a reliable test of whether a given CE activity was successful. Also, the information available for developing estimates of cost per pupil was such that it is likely that there are data errors in Tables 7 through 10.

G. CHARACTERISTICS ASSOCIATED WITH SUCCESS

The possible relationship between change in achievement and the state variables of mobility, mean preachievement level, change in attendance, change in percentage Negro, grade level, and school was analyzed. The only state variable that appears to be related to change in achievement is the preachievement level. All of the regression coefficients for this variable in Table 12 are negative and all are significant at the 5 percent confidence level.

Neither the regression coefficients nor the simple correlation coefficients indicates that mobility, change in attendance, or change in percentage Negro is significantly related to change in achievement.

Figure 2 shows the changes in the lower decile and the mean for each of the 28 observations. In School 1, for example, grade 6 had a change of +1.7 in the mean and a change of -1.6 in the lowest decile. The success of CE does not appear to be related to any specific schools; nearly all have both positive and negative changes.

Except for School 1, the change in achievement as measured by both the mean and the lowest decile showed grade 6 as improving from 1965-66 to 1966-67. The results for grade 5, on the other hand, do not suggest that the response is better at the higher grades than at the lower grades. Based on the overall results, TEMPO suggests that there is no substantial information that success in CE is related to grade level.

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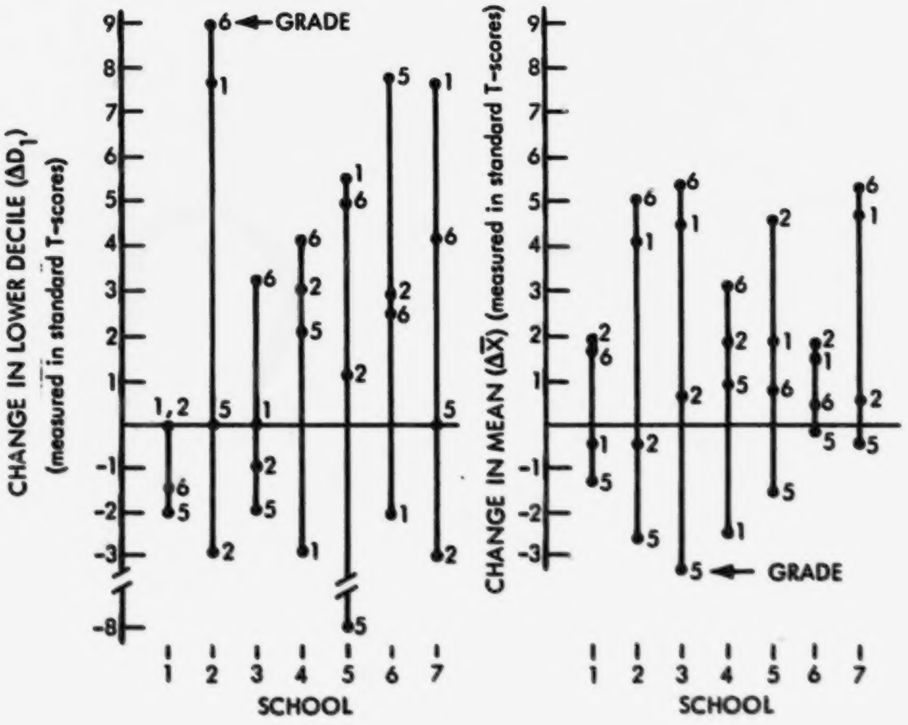

Figure 2. Observed changes in achievement, 1965-66 to 1966-67—District 13.

APPENDIX 2

DESCRIPTION AND ANALYSIS OF DISTRICT 10

A. SUMMARY

This analysis involved 10 of the 54 Title I Schools in District 10. Within these 10 schools, there were approximately 1,600 pupils each year in the 22 grade units included in the sample.

The most intense CE activity amounted to only $88 per pupil in the 22 grades analyzed, and there is only slight evidence that changes in achievement are affected by level of expenditure.

The average change in the mean was negative and the average change in the lower decile was positive between 1965-66 and 1966-67. The averages were not, however, significantly different from zero. The overall level of per-pupil CE expenditure was so low in all 22 observations that substantial improvement between the two years analyzed should not be expected.

The regression and correlation analyses show that change in percentage Negro and mean preachievement level are fairly high and negatively correlated with change in achievement. There is some evidence that higher mobility rates are associated with decrease in achievement level.

In most of the 22 observations the year-to-year variation in expenditures for regular classroom teachers was larger than the expenditures for CE. This suggests that variation in regular expenditures should be taken into account when analyzing the effect from CE programs.

Available data did not indicate any systematic trend in District 10, thus it was decided not to attempt any adjustment for a trend factor.

B. DESCRIPTION OF DISTRICT AND SAMPLE SCHOOLS

Fifty-four of the 127 schools and 49,000 of the 107,000 pupils in school District 10 public school system were enrolled in Title I programs. Approximately 50,000 pupils are enrolled in private schools but less than 5 percent of these pupils are enrolled in Title I programs. None of the private schools is included in the TEMPO sample of schools.

Table 13 lists the characteristics used as criteria for selection of the 10 sample elementary schools and indicates the CE programs for each school in 1966-67. The selection was based on data compiled in the winter of 1965-66 to establish the initial eligibility of schools. When selecting the sample from approximately 55 schools eligible for Title I programs, an attempt was made to cover a wide range of school characteristics. In addition to this criterion, schools were chosen to represent the mix of CE programs of the district. Eligible schools ranged in enrollment from 150 to over 2,500 pupils, and the sample schools chosen cover a large part of that range.

Negro pupils formed 100 percent of the enrollment in a high proportion of the eligible schools. However, among the eligible schools, three were selected which had substantial proportions of other than Negro pupils. In the period since the sample was selected, extensive changes have occurred in pupil populations, and in 1966-67 only one of these schools reported having other than Negro pupils.

About 16 percent of all District 10 pupils were from low-income families; in eligible schools this percentage ranged up to 55 percent. Sample schools had from 22 to 47 percent of economically deprived pupils. School personnel point out that high mobility—the movement of a pupil from one school to another—is a frequent characteristic of schools with substantial proportions of pupils from poorer economic circumstances. Indices of mobility were computed for the sample schools and are shown in Table 14 with attendance and racial concentration percentages.

Improved attendance is an objective of many CE programs. The following attendance data were obtained by school and grade for four consecutive years ending with the 1966-67 term: initial registration, gains, losses, end-of-year membership, average daily membership, average daily attendance, average daily absences, percentage of attendance, and percentage of absences.

Table 13. Sample school characteristics for 1965-66 and compensatory education programs for 1965-67—District 10.

School Characteristics	School Number									
	1	2	3	4	5	6	7	8	9	10
Average Enrollment	186	570	1561	265	1618	272	293	776	506	545
Pupil Mobility (%)	37	18	34	28	54	26	35	22	21	25
Negro Pupils (%)	69	100	100	100	100	74	54	100	100	100
Spanish Speaking Pupils (%)	0	0	0	0	0	0	10	0	0	0
Percentage of Pupils from Low Income Families	27.3	35.5	35.2	31.8	25.3	37.0	22.2	22.0	32.1	49.1
Compensatory Education Programs										
Project Quality	X					X	X			
Teacher Aide	X	X	X	X	X	X	X	X	X	X
Adjustment Teaching							X			
Reduction of Class Size			X							
Clinical Reading		X								
Language Arts [illegible]						X				
Centralized Library		X	X							
Intensive Instructional Improvement (Tri-1)					X			X	X	
English as Second Language							X			
Pre-K Child Development (EOA)					X	X	X			
Head Start (EOA)	X	X	X	X	X	X	X	X	X	X

Table 14. Attendance, mobility, and racial distribution of sample schools (percentages) in District 10.

School	Attendance				Mobility[a]				Negro Pupils			
	63-4	64-5	65-6	66-7	63-4	64-5	65-6	66-7	63-4	64-5	65-6	66-7
1	95	92	89	92	32	35	37	28	20	41	69	100
2	89	92	89	91	29	41	18	62	100	100	100	100
3	89	89	86	90	14	29	34	47	100	100	100	100
4	85	87	87	91	23	28	28	35	100	100	100	100
5	91	92	84	92	39	13	54	25	100	100	100	100
6	83	87	87	88	64	43	26	74	29	52	74	100
7	90	98	90	92	47	53	35	47	7	23	54	44
8	88	90	85	93	43	13	22	17	100	100	100	100
9	87	87	89	91	16	32	21	22	100	100	100	100
10	83	87	85	86	33	29	25	30	100	100	100	100

Note:

[a] (gains + losses) ÷ ADM.

Attendance rates were summarized and examined to detect any systematic change that would be helpful in analyzing the effects of CE programs. A mixed pattern of increases and decreases in attendance rates is apparent. Eight schools recorded decreased attendance for the 1966-67 term. Extensive storm damage was sustained in this school district early in the 1965-66 school year and widespread disruption of school activities was experienced for a period of weeks. The improved attendance of the following year probably reflects the resumption of normal attendance.

Achievement data used in this study were obtained from the regular testing program in District 10. Grades 2 through 5 were tested in September or October using the appropriate battery of the Metropolitan Achievement Test. Grade 6 was tested in March using the Iowa Test of Basic Skills. Achievement data for 1965-66 and

1966-67 were used in this analysis. It is important to note that pupils in grades 2 through 5 had a maximum of 8 months' exposure including summer months, to CE up to the time of the 1966-67 test.

C. TYPES OF CE ACTIVITIES

CE activities in District 10 are described in detail in the Phase I study report (Reference 43), pages 70 to 81. Table 15 summarizes CE activities.

Title I schools had from one to four CE activities in 1966-67. The first activity listed in Table 15 was supported by state funds. The other eight activities listed in Table 15 were supported by Title I.

D. ALLOCATION OF FUNDS FOR CE

Detailed data on level of funding by school, grade, and number of pupils for each of the CE activities listed in Table 15 are given in Reference 43* for 1965-66 and 1966-67.

Table 16 shows expenditures per pupil for all CE activities, and for salaries of regular teachers.

As can be readily seen in the table, the CE expenditures were quite small, the largest being $88, amounting to a 46 percent increase over the expenditures for regular teachers. It would, of course, be an even smaller percentage of the total non-CE expenditures. There were no CE expenditures for pupils in nine of the 22 grades in the sample.

The per-pupil expenditures for regular teachers varied considerably. In the year preceding the 1966-67 test, the highest expenditure of $311 was 2.2 times as large as the smallest expenditure of $141. The correlation between change in expenditures for regular teachers and change in achievement is discussed subsequently.

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* Table 30, page 87, and Tables 71 through 79, pages 201 through 208.

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Table 15. CE activities in District 10.

Short Title and Description	Expenditure ($1,000)		Target Group	
	1965-66	1966-67	1965-66	1966-67
Quality Instruction. To improve instruction in schools with substantial change in pupils because of integration.	Small increment in funds from state resources		All pupils in schools with more than 1/3 Negro pupils. Usually not a Title I school	
Teacher Aids. To relieve teachers from non-professional tasks and provide increased attention to disadvantaged pupils.	488	912	10,500 pupils, grades K-2, 53 schools	11,500 pupils, grades K-2, 53 schools
Reduction of Class Size. To make more individualized instruction possible by reducing class size.		257		720 pupils, grade 1 in 12 schools
Clinical Reading. To improve writing, reading, spelling, work habits, and power of concentration.	50	107	151 pupils, grades 3-6, 10 schools	170 pupils, grades 3-6, 12 schools
Language Arts Teaching Consultants. To provide imaginative approaches to meet individual needs for improving listening, speaking, reading, and writing.	[illegible]	[illegible]	[illegible] pupils, grades 1-6, 2 schools	[illegible] pupils, grades 1-6, 2 schools
Centralized Libraries. To provide better libraries to serve both the school and community.	461	441	Approximately 5 new schools each year starting in 1965-66	

Table 15. (continued)

Short Title and Description	Expenditure ($1,000)		Target Group	
	1965-66	1966-67	1965-66	1966-67
Intensive Instructional Improvement. To provide substantial increases in resources for schools with most disadvantaged pupils, including instruction, health care, social work, and school administration.		685		16,500 pupils, grades K-6, 17 schools
English as a Second Language. To teach English to pupils from homes where little or no English is spoken.	51 Summer'66	66	303 pupils, grades 1-12	320 pupils, grades 1-12, 9 schools
Summer Program for Reading - Enrichment - Recreation. To provide special services to educationally deprived pupils.	2,534 (Includes 850 for play equipment) Summer'66	1,302 Summer'67	9,000 pupils, grades 2-12, all 54 Title I schools	9,939 pupils, grades 1-12, all 54 Title I schools

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Table 16. Per-pupil expenditures for sample schools by grade - District 10.[a]

School	Grade	Year Preceding 1965-66 Test		Year Preceding 1966-67 Test	
		CE $	Reg. $	CE $	Reg. $
1	3	0	239	0	204
	4	0	296	0	228
	6	0	155	21	311
2	3	0	165	19	213
	4	0	155	50	147
	6	0	178	88	189
3	6	0	156	8	196
4	3	0	171	11	157
	6	0	199	0	303
5	3	0	145	0	185
	5	0	135	0	179
	6	0	180	6	149
6	3	0	208	27	185
7	3	0	187	30	237
	6	0	225	41	236
8	3	0	144	0	208
	6	0	175	6	171
9	3	0	139	6	162
	6	0	191	5	144
10	3	0	147	0	148
	5	0	124	0	141
	6	0	199	0	193

Note:

[a] Expenditures for teachers and aides based on average salary for each throughout the district. The same average was used for both years.

E. ANALYSIS OF TREND

Examination of time series data on reading test scores from sample schools in District 10 do not yield sufficiently strong indications of a trend of declining reading performance to warrant statistical adjustment of measures of enhancement in achievement from CE.

The Iowa Test of Basic Skills is administered to grade 6 pupils in the spring of each year. These tests constitute the terminal measure of a pupil's performance in elementary school and are employed as an aid in determining his placement in the intermediate school. Figure 3 presents graphs of the average reading scores for the 10 sample schools.

The lower right of Figure 3 is the weighted average of reading performance of all sixth grade pupils during these school years. Although the graph of the average for all 10 schools shows a general downward trend, TEMPO decided not to make an adjustment for trend for two reasons. First, as all the graphs show, the most dramatic downward shift was between 1964 and 1965 but this coincides with the publication of a new form of the test and new norm tables in 1965. The pattern of change is so systematic among all 10 schools that it is tempting to attribute most of the change to the changed test.

The second reason for not recommending an adjustment for trend is that there are only 3 years of data prior to the 1967 test (i. e., until CE programs were implemented). Within this 3-year period there was a decrease from 1963-64 to 1964-65 and an increase from 1964-65 to 1965-66. This difference in direction plus the effect of a change in tests between 1963-64 and 1964-65 provides very little confidence for developing an estimate of trend. Additional analysis was carried out on average reading scores for grade 3 pupils in four sample schools, but there was no evidence of a systematic trend over the period of 1963-64 through 1967-68.

F. DISTINGUISHING FEATURES OF SUCCESSFUL CE

The average change in the mean was negative, but the average change for the lowest decile was positive over the entire 22 grade observations in District 10. However, as shown in Table 17, neither the weighted nor unweighted averages are significantly

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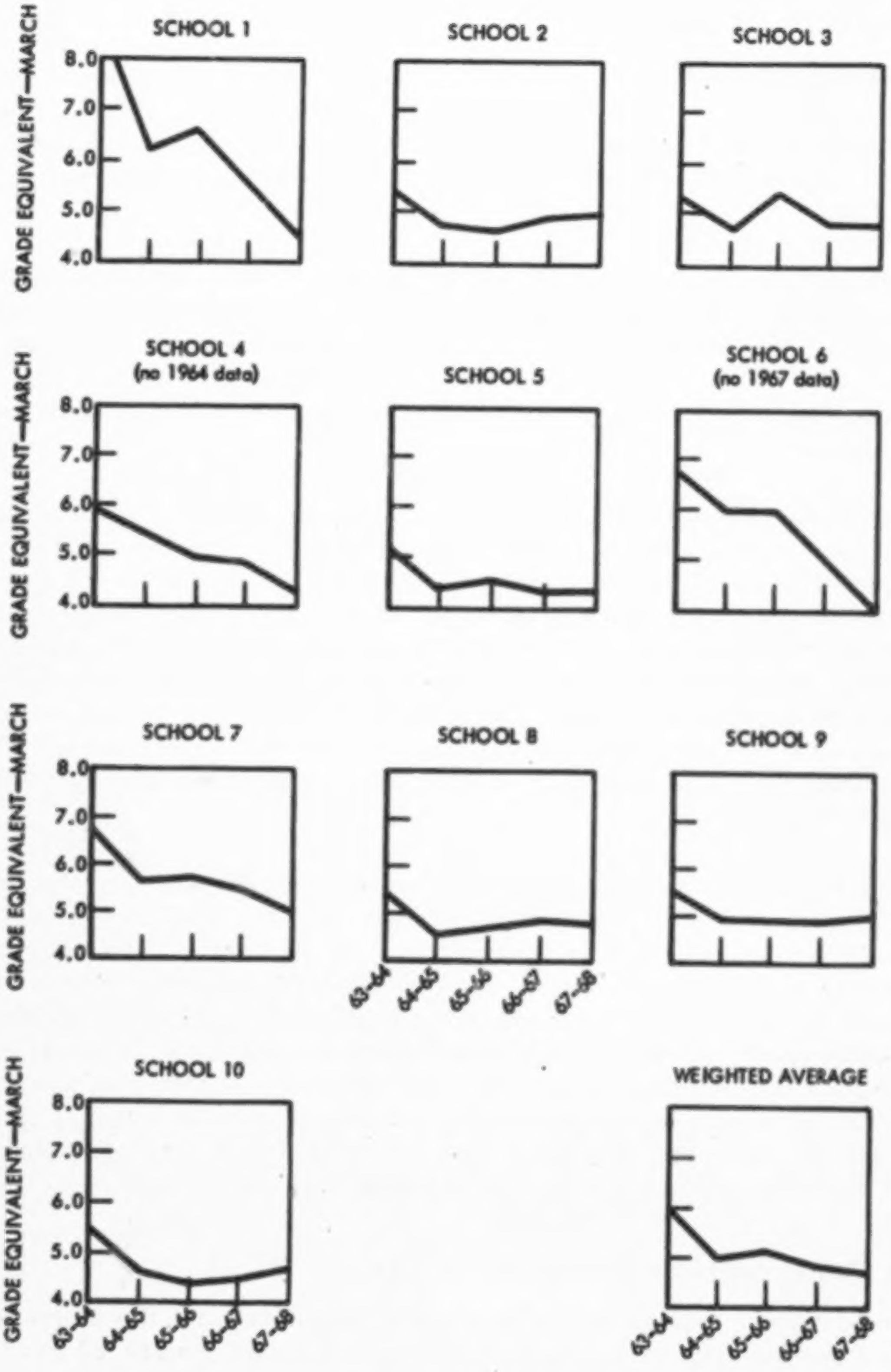

SCHOOL 1

SCHOOL 2

SCHOOL 3

SCHOOL 4
(no 1964 data)

SCHOOL 5

SCHOOL 6
(no 1967 data)

SCHOOL 7

SCHOOL 8

SCHOOL 9

SCHOOL 10

WEIGHTED AVERAGE

Figure 3. Average reading scores–grade 6 sample schools in District 10.

Table 17. Average change in achievement from 1965-66 to 1966-67 for 22 observations in District 10.[a]

Measure of Achievement	Unweighted Observations[b]			Weighted Observations[c]		
	Average Change	Std. Error	Signif. Level[d]	Average Change	Std. Error	Signif. Level[d]
Δ Mean	-0.46	0.59	0.50	-0.34	0.34	0.40
Δ Lowest Decile	0.31	0.81	e	0.25	0.59	e
Δ Lower Quartile	0.03	0.83	e			
Δ Upper Quartile	-1.23	0.58	0.05			

Notes:

[a] In units of Standard T-scores and based on 1,600 pupils in 22 grade units of 10 schools.

[b] Average of the 22 observations.

[c] Average with each sample observation weighted by the average number of pupils who took the pre- and posttests.

[d] Probability that the observed sample result could have happened by chance if the true change over the test interval was indeed zero.

[e] Greater than 50 percent.

different from zero. It is not surprising that strong positive results were not obtained because the average per-pupil expenditure for CE in 1966-67 was only $14, or a 7 percent increase over the expenditures for the regular program.

The regression coefficients in Table 18 show the expected change in achievement for a unit change in each of the determining variables. For example, in Model 1 the regression coefficient of -0.418 suggests that a decrease of one standard T-score in preachievement is associated with a change of +0.418 in the mean. Four different models* are used for showing how changes in achievement might be explained by changes in both state-of-condition variables, such as preachievement level, and resource variables, such as expenditures for CE. Conclusions drawn by TEMPO are based on a summary of the coefficients in all four models since there is no definite way of selecting one model over the others.

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*Explained in Section C, Appendix 6.

Table 18. Estimated regression coefficients for models described in Appendix 6 – District 10.

Model Number	Dependent Variable	Constant Term.	Determining Variables[a]									
			M_1	$(M_1-\overline{M})$	X_1	$(\overline{X}_1-\overline{X})$	ΔAtt.	Δ$ R	Δ$ CE	$ F	Δ Neg	R^2
1:	$\Delta\overline{X}$			-0.019		-0.418	-0.034	-0.003	-0.003		-0.050[b]	0.54[d]
				(0.004)		(0.142)	(0.151)	(0.011)	(0.027)		(0.026)	
	ΔD_1			-0.052		0.324[b]	0.214	-0.018	0.012		-0.057	0.41[c]
				(0.068)		(0.218)	(0.234)	(0.017)	(0.041)		(0.040)	
2:	$\Delta\overline{X}$			-0.016		-0.405[d]				-0.860	-0.049[b]	0.54[d]
				(0.028)		(0.133)				(1.278)	(0.024)	
	ΔD_1			-0.053		-0.364[b]				-0.596	-0.061	0.34[b]
				(0.046)		(0.216)				(2.072)	(0.039)	
3:	$\Delta\overline{X}$	17.79	-0.027		-0.435[d]		0.038	-0.002	0.013		-0.042[b]	0.54[d]
			(0.046)		(0.144)		(0.176)	(0.011)	(0.033)		(0.028)	
	ΔD_1	15.01	-0.055		-0.330[b]		0.240	-0.018	0.017		-0.054	0.40[c]
			(0.072)		(0.227)		(0.277)	(0.018)	(0.051)		(0.144)	
4:	$\Delta\overline{X}$	17.58	-0.017		-0.431[d]					-0.201	-0.046[b]	0.54[d]
			(0.029)		0.141					(1.633)	(0.025)	
	ΔD_1	15.04	-0.050		-0.309					-1.982	-0.066	0.37[c]
			(0.046)		(0.226)					(2.625)	(0.040)	

Notes:

[a] Variables are defined as: $\Delta\overline{X}$, ΔD_1 = change in mean and lower decile reading achievement measured in standard T-scores; M_i=% mobility; $(M_i - \overline{M})$ = difference between mobility in school i and sample average for district, ΔAtt. = change in % attendance rate; Δ$R = change in expenditures for regular teachers; Δ$CE = change in expenditures for CE; $F = (Δ$R + Δ$CE) ÷ ($R pre + $ CE pre). For further details, see Appendix 6. The estimate of standard error is shown in parentheses below the respective regression coefficient.

[b] Significant at the 10% confidence level

[c] Significant at the 5% confidence level

[d] Significant at the 1% confidence level

None of the regression coefficients measuring the effect of change in level of expenditures appears significant. This means that the regression analysis cannot be used to identify level of expenditure as a distinguishing feature of successful CE.

Most of the CE expenditures in grades 3, 4, and 6 in School 2 were for a project called Clinical Reading. Table 19 shows the results for grades 4 and 6 compared to the average for all 22 grades in District 10 sample schools. There is little information on which to judge the clinical reading activity, but grade 6 in School 2 did have the largest per-pupil expenditure and also showed the most favorable change in reading achievement.

Table 19. Results from clinical reading activity versus CE activity – District 10.

Expenditures ($ per pupil)	School 2[a] Grade 4	School 2[a] Grade 6	All 22 Grades in 7 Schools
Expenditures Pre Year ($ Per Pupil)			
CE	0	0	0
Regular Teachers	155	178	178
Expenditures Post Year ($ Per Pupil)			
CE	50	88	15
Regular Teachers	147	189	195
Change in Mean (Standard T-score)	-2.6	1.3	-0.46
Change in Lowest Decile (Standard T-score)	-0.8	2.8	0.31

NOTE:
[a] Approximately 80 percent of the CE expenditures was for a clinical reading activity.

Figure 4 compares four successive fall tests and the fall and spring tests for 1966-67 for four schools in District 10. Grade 3 in School 2 shows the greatest gain between the fall, 1966 and spring, 1967 tests. School 2 not only had the largest expenditure for CE, but is also the only one of the four schools that had the clinical reading activity. The gains are larger than the corresponding gains during the same interval in 1963-64.

In summary, there is very little District 10 data for identifying distinguishing features of successful CE activity. The information that is available suggests no strong hypothesis about features that distinguish between successful and unsuccessful CE activities.

G. CHARACTERISTICS ASSOCIATED WITH SUCCESS

Since CE expenditures were low and the average change in achievement was negative, little analysis could be carried out to identify state-of-condition variables that might be associated with successful CE. However, the possible relationships between change

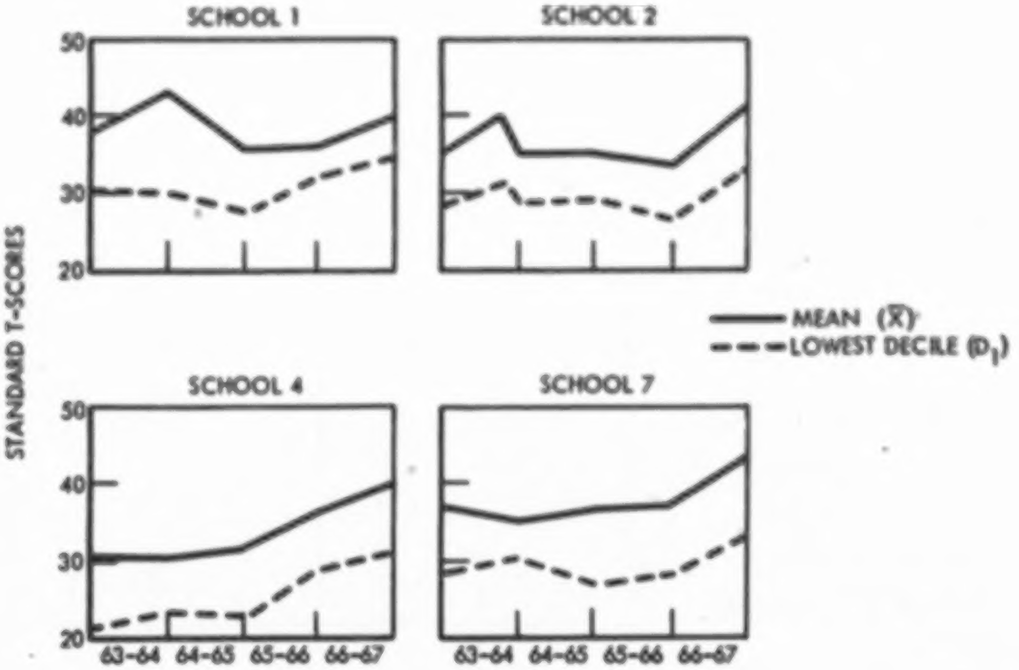

Figure 4. Mean ($\bar{X}$) and lowest decile (D_1) achievement level for grade 3 in four sample schools in District 13.

in achievement and mobility, mean preachievement level, change in attendance, change in percentage Negro, grade level, and school were analyzed.

The mean preachievement level and the change in percentage Negro are the two variables most highly correlated with change in achievement. In Table 18 the regression coefficients for change in percentage Negro (Δ Neg) are significant at the 10 percent level using the change in the mean ($\Delta \bar{X}$) as the dependent variable. The simple correlation coefficients between change in percentage Negro and $\Delta \bar{X}$, ΔD_1, ΔQ_1, and ΔQ_3 are -0.40, -0.33, -0.52, and -0.01, respectively.

The regression coefficients for "mean preachievement level" ($\bar{X}_i$ and $\bar{X}_i - \bar{X}$) are negative and statistically significant at the 10 percent confidence level when ΔD_1 is used as the dependent variable.

All of the 10 regression coefficients for the mobility variables (M_i and $M_i - \bar{M}$) are negative. None is statistically significant at the 10 percent confidence level, however.

The majority of the regression coefficients for change in attendance is positive, but none is significantly different from zero. The simple correlation coefficients are positive, but like the regression coefficients, are quite small.

Change in achievement did not appear to be correlated with grade level. Each of grades 3, 4, 5, and 6 included in the sample showed about the same pattern of positive and negative changes. Figure 5 shows the changes in achievement as measured at the lowest decile and the mean for each grade in each school. In School 1, for example, the change in the lowest decile for grade 3 was +4.8, but the change in the mean for the same grade was negligible (+0.1). All but one of the changes in the lowest decile for grade 6 are positive, but the changes in the mean are about equally divided between positive and negative values. The pattern of changes shown in Figure 5 suggests that direction and amount of change are not related to specific schools. Nearly every school has some grades with positive and some with negative changes.

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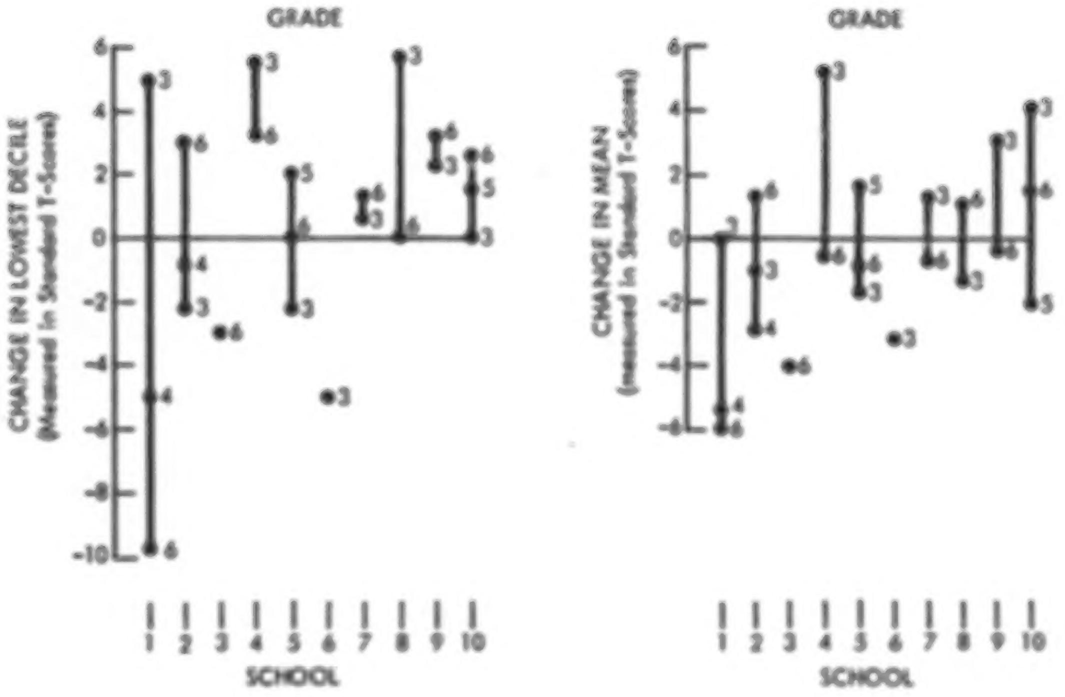

Figure 5. Observed change of reading achievement between 1965–66 and 1966–67 tests – District 10.

APPENDIX 3

DESCRIPTION AND ANALYSIS OF DISTRICT 14

A. SUMMARY

Probably the most important result of the analysis of the compensatory education program of District 14 is that observation of grades 3, 4,and 6 in six elementary Title I schools indicates no enhancement of student achievement between the fall of 1966 and fall of 1967 despite an extensive CE program in these schools during that period. In fact, the changes in the mean, lowest decile, lower quartile and upper quartile were all negative, but only that of the lowest decile was statistically significant. In contrast, the changes between the fall of 1965 and fall of 1966, when there were only the beginnings of a CE program, were positive for the mean and lowest decile. It is reasonable to have expected positive results between 1965-66 and 1966-67 in light of the 18 percent increase in total per-pupil expenditures during this period.* The allocated salary expenditures increased for all grades studied. The total Title I grants for 1965-66 and for 1966-67 were approximately the same although the bulk of the 1965-66 expenditures were for nonsalary items.

The type of CE activities implemented by District 14 mainly provided additional increments to existing educational programs, primarily through the reduction of pupil-to-teacher ratios in the elementary grades. Small amounts of expenditures were used for experimenting with new concepts such as large-scale ungraded instruction in one elementary school, experimenting with new reading materials in certain grades, preparing curriculum materials particularly suited to disadvantaged children, and conducting special in-service training for teachers in schools serving the disadvantaged.

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* Although the 18 percent increase was not adjusted for increases in pay to compensate for a 3 percent increase in cost of living during this period, it still represents a substantial increase in real expenditures.

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Several approaches were investigated in an effort to refine the data and reduce sampling variation. Per-pupil expenditures were allocated to the grade level for both regular and CE activities in an effort to separate the effects of various activities on individual groups of students. Analysis of possible trends in the district, individual schools or individual grades showed slight upward trends for two grades and a slight downward trend for one grade. None of these trends was statistically significant and thus no adjustments were made.

Several statistical analyses were undertaken to determine which variables, if any, were related to changes in student achievement. Included were student mobility, average initial achievement level, level and change of attendance rate, level and change of percentage Negro, and change in both regular and CE per-pupil expenditures. With minor exceptions none of the regression or correlation coefficients was statistically significant. Such results were not surprising because of the large sampling variation and limited number of observations. There were 18 grade units in the sample, but for several variables the effective sample size was only six data points because data were available only at the school level.

The planning and research department of District 14 has attempted in several ways to evaluate its compensatory education activities. Most of these have been subjective in nature and usually involved questionnaires and opinions solicited from teachers, administrators, students, and parents. Almost all of these subjective reactions to Title I programs have been favorable. A few Title I activities were evaluated on an objective basis using the criteria of standardized achievement test scores. These studies also show no achievement gain by students involved in CE activities. The district administration has recognized these results and is attempting to reorient some of its programs. Despite this objective evidence, the staff and administration of the district remain convinced that the ESEA Title I program in total has been very beneficial for their district. They feel that its purposes and activities have successfully focused attention on the needs and problems of disadvantaged children. From this have come efforts in both the regular and CE educational programs to meet these special needs. Administrators at the elementary level also point out that Title I has brought new attention to the elementary grades as a critical location for recognizing and correcting educational deficiencies.

B. DESCRIPTION OF DISTRICT AND SAMPLE SCHOOLS

District 14 is a citywide school system serving the inhabitants of a medium-sized city. In the fall of 1966, almost 96,000 students were enrolled in kindergarten through grade 12, with over 42,000 being in grades 1 through 6. This public school system is presently ranked almost 20th in size among the nation's city school districts. There are 118 schools serving the 88.5 square-mile area of the city of which 86 are elementary. As a typical urban school system, it offers elementary and secondary educational programs, vocational education, programs for handicapped students, a Head Start program for pre-schoolers, and other special education services.

School Integration

The district is integrated racially, although many inner-city schools have mostly Negro pupils because of the nature of their attendance areas. Significant percentages of other nonwhite races are also present in this school district. A voluntary transfer program (including bussing) was started in 1963 with 237 students involved; by 1967 over 2,000 students, many of them Caucasians, were participating. In October 1967, the city school enrollment was distributed as follows: 83 percent Caucasians, 10.4 percent Negro, 2.4 percent Japanese, 1.5 percent Chinese, 0.8 percent Filipino, 0.6 percent Amerindian, and 1.3 percent other. Of the total certificated school staff, 92.5 percent were Caucasians, 4.7 percent Negro, and 2.1 percent Japanese, with other races representing less than 0.3 percent each.

Selection of Title I Sample Schools

As intended by the ESEA Act not all schools in District 14 received Title I funds. Among the 85 elementary schools in District 14, 10 schools were classified as deserving total aid and eight schools classified in the partial aid category by the district administration. Ten secondary schools were also designated to receive full or partial Title I aid.

Of the 18 elementary schools receiving aid, six schools were selected by TEMPO as a sample for detailed analysis during Phase I of this study. Test data were available within each school for grades 3, 4, and 6, thereby producing a total of 18 grade units in the sample. The intent in choosing the sample was to obtain a representative group of schools, but yet a group which would have

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extensive Title I activities serving the students. Thus in one sense it was to be a group of schools that were the "worst" compared to the rest of the district. For many years the district has ranked each of its elementary schools by such factors as absentee rate, suspension and dropout rates, percent of minority races, psychological and achievement test results, social services referral rates, physical fitness test results, and welfare food services. These indices, along with the percentage of families from each school below specified income levels, were used by the district as a basis for designating schools for maximum and proportionate compensatory aid. These indices were also used by TEMPO in conjunction with other known characteristics and knowledge of local Title I programs to select the sample. No composite index was used as quantitative selection criterion, but the district did calculate an equally weighted composite rank of the first five of the above factors for 1965-66. Five of the sample schools were in the poorest eight elementary schools and the sixth school (selected for being largely non-Negro) was the 15th poorest, based on this composite.

Table 20 summarizes relative positions of the sample schools based on selected characteristics. All six schools in the sample are in the group that the district classified as "maximum aid" schools.

Achievement Tests

The group testing program in District 14 is a consistent, citywide testing schedule administered each fall to specified grades. The basic instrument for the achievement testing program is the Metropolitan Achievement Test (MAT), given to grades 2, 3, 4, 6, 8, 9, and 10. In addition, the Lorge-Thorndike Intelligence Tests are administered to grades 2, 4, and 6. The exact subtest, forms, and testing dates are summarized in Table 21. The testing scores were received by TEMPO mainly as frequency distributions of raw score units for each of the years 1964-67. The scores for the reading subtest were individually converted to standard "T" score units using the conversion tables provided by the publisher of the MAT tests. The standard scores were then computer-processed to obtain

Table 20. Sample school characteristics, 1966-67 – District 14.[a]

School Characteristics	School Number						
	1	2	3	4	5	6	District Median
Percent of Families Earning Less Than $3,000 in 1959							
Rank	67	81	85	86	80	83	44.5
Value (%)	14	18	33	40	18	23	10
Pupil-to-Total Certificated Staff Ratio[b]							
Rank	11	16	7	5	1	4	44.5
Value	20.2	21.4	19.5	19.2	17.9	19.0	24.8
Average Teacher Salary, Including Title I Teachers							
Rank	10	6	54	14	6	41	41.5
Value ($)	7219	7203	8148	7289	7028	7903	7934
Percent Change in Enrollment over 5-Year Period							
Rank	33	6	72	80.5	85	28	44
Value (%)	-1.2	+13.1	-17.1	-23.6	-57.9	+0.4	-4.2
Suspension as Percent of Enrollment							
Rank	79.5	70.5	40	59	1	81	44.5
Value (%)	.65	.44	.15	.25	0	.66	.17
Absences Percent of Student Days							
Rank	79	82	84	85	66	80.5	44.5
Value (%)	6.4	6.8	7.4	8.0	5.8	6.5	5.1
MAT Verbal Composite Score, Grade 4 Median in Percentiles							
Rank	55	11	12.5	8	2	4	43
Value	20	31	32	25	14	17	50
Intelligence Verbal Test Score, Grade 4 Median in Percentiles							
Rank	4.5	8.5	14	8.5	3	6	43
Value	25	37	44	37	22	29	59
Percent Negro as of Fall 1967							
Rank	83	35	79	77	86	84	42.5
Value (%)	81.1	2.3	45.2	28.7	94.6	83.5	3.7

Notes:

[a] Rankings are based on a total of 86 schools.

[b] Since October 1966 is the effective date of this calculation, the additional Title I certificated personnel are included.

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Table 21. Achievement test data – District 14.

Grade	Test & Subtest	Form Used				Month Tested			
		1964	1965	1966	1967	1964	1965	1966	1967
2	MAT-Primary II Reading Only	C	[a]	C	C	Sept. 21 -Oct. 11	[a]	Sept. 19 -30	Sept. 6-29
3	MAT-Elementary Battery	B	B	B	B	Sept. 21 -Oct. 9	Oct. 4-15	Oct. 3-14	Oct. 2-13
4	MAT-Elementary Battery	B	B	B	B	Sept. 21 -Oct. 9	Sept. 20 -Oct. 1	Sept. 19 -30	Sept. 6-29
6	MAT-Intermediate Battery	Am	Am	Am	Am	Sept. 21 -Oct. 9	Sept. 20 -Oct. 1	Sept. 19 -30	Sept. 6- -29
8	MAT-Advanced Battery	Am	Am	Am	Am	Sept. 21 -Oct. 9	Sept. 27 -Oct. 26	Sept. 26 -Oct. 21	Sept. 6-Oct. 20

Note:
[a]Not administered.

statistical means, standard deviations, and other summary statistics for each grade level in each sample school.*

Since these tests were given each fall within a very restricted time period, they provide without further adjustments an excellent year-to-year comparison for each grade within the fixed-grade concept. The final sample did not consider grades 2 and 8 and, therefore, these test data were not completely processed. Measures of student achievement were utilized rather than intelligence or other measures of ability since the objectives of most of the compensatory education programs were stated in terms of raising student achievement levels.

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* The conversion process gives a different result than if the raw score distributions for each grade were first summarized by means and standard deviations and then converted to standard score units. This is because the conversion from raw scores to T-scores is not a linear transformation. As a result, the summary statistics for these grades may differ somewhat from the summary statistics as reported directly by the school districts.

C. TYPES OF CE ACTIVITIES

Federally aided compensatory education in District 14 started in the spring of 1966 under the ESEA, but the local district had allocated special funds for CE purposes at least as far back as 1964-65.* Moreover, when the 1966-67 Title I funds were cut back 8 percent from proposed levels, the district allocated the $140,000 necessary to allow the planned CE activities to be fully implemented. District 14 was awarded a Title I grant of $1,662,538 in December 1965 (including planned summer 1966 activities). For 1966-67 (including summer 1967), a Title I grant of $1,568,303 was received. The goals, approaches, and projects were essentially the same in 1967-68. For comparison, the district's total actual expenditures for 1965-66 were almost $55 million and for 1966-67 were about $62.5 million. In total, about 9 percent of the total budget of the district came from the Federal Government for Head Start, compensatory education, and other special education projects.

There are several unusual aspects of District 14's CE program which should be noted. The organization of the schools designated as eligible for Title I funds was specified differently than in many other districts. Instead of creating a staff or advisory position to oversee the implementation of the Title I projects, a line position directly responsible for the operation of all aspects of the appropriate schools was established. At the elementary level a Director for Elementary Instruction was appointed who had direct responsibility for all 18 designated Title I elementary schools. A person in a similar position had responsibility for the eligible Title I junior and senior high schools. In this way, CE activities were fully integrated into the operation of the appropriate school, and the responsible official had cognizance over hiring and reassignment of staff, discipline, facilities, curriculum, and other important attributes of compensatory education projects. Another aspect is the emphasis on elementary programs, as can be seen from the relative cost figures of Tables 22 and 23. However, classroom equipment and other special instructional equipment could be, and was, acquired under Title I funds, mostly in 1965-66.

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*Amounting to $450,000 in 1964-65 and in 1965-66. Over 90 percent of these funds was spent on extra personnel for three disadvantaged junior high schools and eight disadvantaged elementary schools. Four of the eight elementary schools are included in the present study.

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Table 22. Program budget, 1965-66 — District 14.

Program Category	Title I Funds[a]	Elementary Students	Target Group
Elementary SCORE	$ 476,409	100	11,500 elem. and secondary pupils in 28 Title I schools
Secondary SCORE	205,058	0	
Curriculum Development and Services	42,420	60	Supported all staff in 23 Title I schools
Diagnostic and Remediation Center	65,253	100	500 elem. pupils as referred from 86 schools
Health Services	17,003	50	Available to 25,000 pupils in 28 schools
Volunteer Services	8,991	68	
Personnel	7,454	80	
Work Experience Program	64,910	0	80 mentally retarded children
Summer Programs (Summer 1966)			
Special Summer School	332,400	100	1,750 pupils and 450 staff
Summer Writing Workshop	53,917	0	Secondary school teachers
Summer Reading Program	63,486	100	Specially selected pupils
Summer Recreation Program	15,469	50	
Planning and Research Program	20,219	50	Support to total program
General Administration	289,548	50	
TOTAL (1965-66)	$1,662,537		

Note:

[a] In addition, the district provided approximately $450,000 of its own CE funds in 11 disadvantaged schools during 1965-66.

Table 23. CE Program budget, 1966-67 – District 14.

Program Category	District Funds	Federal Funds	Target Group[a]
Elementary			
Elementary SCORE	$ 20,443	$ 697,314	5,455 elem. pupils in 18 schools
Transportation of Elementary Pupils	0	106,466	350 elem.pupils
Bus Monitors	34,300	0	
Secondary SCORE	2,050	234,512	5,497 secondary pupils in 6 JHS and 4 SHS
Curriculum Development and Services	5,000	68,434	Approximately 400 teachers in 18 schools
Diagnostic and Remediation Center	8,490	71,628	350 elem. pupils as referred from 86 schools
Health Services	0	33,317	Available to all 25,000 pupils in 28 Title I schools
Intergroup Relations	0	25,730	
Neglected and Delinquent Children (NEDEL)	0	25,319	Special program at 3 Inst.
In-Service Education	0	4,905	30 selected elem. and secondary teachers for one week
Pacific Work Experience Program	1,538	24,462	80 mentally retarded pupils-3 hours daily
Summer Programs (Summer 1967)	38,500	12,476	Fed. funds-60 JHS disadvan. boys. Dist. funds-selected teachers and pupils
Planning and Research Program	0	22,120	
General Administrative			
Fringe Benefits	1,655	79,791	Supported total CE program[b]
Administration Cost	0	66,502	
Substitute Teachers and Clerical	10,610	0	
Nonpublic Schools, CE Activities	0	42,070	
Rental and Installation of Portables	12,300	39,267	
Misc. - Office Rental and Travel	5,114	13,990	
TOTAL (1966-67)	$140,000	$1,568,303	

Notes:

[a] Numbers represent actual participants, where known, and total potential participants otherwise.

[b] Nonpublic Schools Program served 1,038 elementary pupils.

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Another important aspect that does not show up in the written reports and evaluations concerns the particular attention the district took to interest and assign better teachers to the disadvantaged schools. Based on subjective information obtained while visiting the various schools in the district, it was evident that the administration took pains to select effective teachers and to convince these teachers of the importance and personal satisfaction of teaching in the disadvantaged schools. While no financial incentives were offered for such assignments, this special concern by the administration helped to establish and maintain a high level of morale among the staff of these schools. In spite of this, problems of discipline and student racial unrest did cause some teachers to seek reassignment, although the district appeared to have succeeded in obtaining exceptional cooperation and loyalty from its professional staff.

District 14 designed its objectives to be consistent with the ESEA. As stated in its application for federal aid, the specific objectives of the overall Title I program were as follows:

1. Design, develop, and use curriculum materials and methods especially suited for the educationally disadvantaged child;
2. Design and use methods and materials suited for arrested language and perceptional development;
3. Reduce the rate and severity of disciplinary problems;
4. Increase the quality of instruction and the quality of learning so as to improve performance as measured by standard achievement tests.

The district has attempted to achieve these objectives through the implementation of several projects which will be described below. Some of these projects have been carried out during the summer months and others have been incorporated in regular programs held during the regular school year. Although some efforts were extended during the spring of 1966, and others during the summer of 1966, most programs have been in effect systematically only since the beginning of school year 1966-67.

The actual treatment of students in these programs was not so much intensive instruction in subjects, such as reading and arithmetic, as it was increased opportunity to receive more than the usual degree of medical and dental care, to see and participate in more of the cultural events in the city, and to travel around the area on field trips. The instruction itself involved reduced class sizes, the addition of teacher aides, the purchase and use of more than the usual amounts of curriculum aids, audio-visual aids, and textbooks.

School Community Organization for Realization by Education (SCORE)

The main thrust of the district's 1966-67 Title I program is a project named "School Community Organization for Realization by Education" (SCORE), which has both elementary and secondary components. For both years, this SCORE project has accounted for over 80 percent of the total Title I funds. It is essentially a substructure of administration curriculum planning, extra teaching services, research, community liaison, volunteer services, and medical services, which has been created with the expressed responsibility of identifying, remedying, and eliminating the manifest problems of the educationally disadvantaged in this district. The most critical present need was perceived as a reduced pupil-to-teacher ratio to assist in the control of behavioral and attitudinal problems and provide a desirable setting for revision and testing of curriculum materials and methodology. The elementary schools were the level for major emphasis.

ELEMENTARY SCORE. The stated purpose of this project is to increase the instructional effectiveness of teachers and the learning effectiveness of pupils who attend schools located in the neighborhoods that are predominately populated by low-income families. The Elementary SCORE Project was designed to provide for the special educational needs of educationally deprived pupils who are characterized by: (1) having significantly lower academic achievement, (2) lacking motivation toward school work, (3) possessing a poor self-image, (4) having a below-average experience background. The program provides the following services:

1. A Coordinator of Elementary Instruction who has the line responsibility for the development and implementation of all elementary programs relating to educationally disadvantaged schools. Secretarial support for the coordinator is provided.
2. Seventy-two classroom teachers are assigned to disadvantaged elementary schools. By combining Title I and school district funds, kindergarten through grade 3 classes now have a 20 to 1 pupil-to-teacher ratio and grades 4 through 6 a 25 to 1 ratio with few exceptions.

3. Eighteen clerk-typists have been employed as additions to the disadvantaged elementary schools.
4. Thirty-seven teacher aides have been employed to support classroom teachers.
5. Elementary schools have been allotted field trip allocations.
6. An Administrative Assistant has been assigned as part of the Model School Program.
7. Extra minor budget items including office supplies, travel, instructional supplies, and instructional equipment including textbooks.

SECONDARY SCORE. The secondary level program provides a multi-service approach in attempting to offer equal educational opportunities for educationally deprived pupils residing in attendance areas where there are high concentrations of children from low-income families. Briefly summarized, these special services include the following:

1. One full-time counselor is assigned to each of the 10 participating secondary schools. All counselors have been relieved from most routine clerical and nonprofessional tasks.
2. Basic skills instruction is provided to academically deficient students with the goal of improving the attitudes and educational proficiency of potential dropouts.
3. A reentry program provides special small classes (10 students) for basic skills instruction for students who have been suspended from the regular school program. The reentry program reduces the educational lag that inevitably occurs when students have been suspended from school for breach of rules and regulations usually related to discipline or attendance matters.
4. A theme-reader program enables teachers to increase the quality and quantity of student compositions, which otherwise must be kept to a minimum because of a lack of opportunity for the teacher to read and correct them.
5. The district has established a breakfast program offered free of charge to eligible students, since poor scholastic attainment among students from low-income families may often be traced to a nutritional lack.

6. The assignment of teacher aides to improve the instructional efficiency of the professional staff has been recommended, as the efficiency of the highly skilled and talented teacher is often limited by an accumulation of routine clerical tasks.
7. Because children from low-income families have few experiences outside their own neighborhood, field trips are planned for them. During 1965-66, local, state and federal funds provided 544 field trips for school children from both public and private schools.

Curriculum Development and Services

Under the supervision of the Assistant Superintendant for Curriculum Development and Services, the Title I Curriculum Office works in cooperation with teachers assigned to Title I schools to develop new programs, materials, and services to meet the special needs of disadvantaged students. Emphasis is placed upon programs and materials which serve to develop basic language skills and to improve self-image.

Curriculum projects of the Center are:

1. To edit and to produce the materials prepared by elementary teachers during the summer of 1966;
2. To supervise an intensive newspaper study program in grade 6 and 9 classes with classes receiving copies of the two local dailies throughout the school year;
3. To work with teacher committees to examine the entire curriculum in Title I elementary schools for the purpose of recommending curriculum changes to provide a program adapted to the needs and interests of disadvantaged students;
4. To work closely with Planning & Research in evaluating the new curriculum materials and programs being used in Title I schools.

Curriculum services of the Center are:

1. To provide advice and aid to teachers using new materials and programs;
2. To maintain and to operate a curriculum materials center;

3. To maintain and to operate a comprehensive professional library containing books dealing with the problems of disadvantaged students;
4. To sponsor workshops and demonstrations of new materials and techniques;
5. To purchase new materials for use on a trial basis.

Diagnostic and Remediation Center

With parental consent, principals of schools which have a preponderance of pupils classified as disadvantaged refer pupils (up to 500 each year) who have been identified as having learning disabilities to the Diagnostic and Remediation Center. Upon referral, a social worker from the diagnostic center initiates an interview with both parents, if possible at the home, or in the Center, whichever is most convenient. The purpose of the interview is to gain the parents' cooperation and to explain the program of the Diagnostic and Remediation Center. The pupil is thoroughly examined through the use of extensive psychometric batteries to determine achievement, intelligence, personality structure, and basic learning disabilities. When appropriate, the pupil is seen by a speech therapist or psychiatric consultant. A review of the pupil's evaluation is conducted by a psychologist, a social worker, and the remediation teacher. A program of remediation is developed to meet the pupil's specific learning problems. A follow-up interview with the parents is scheduled to keep the parents informed of progress. When possible, pupils having like problems are grouped into groups of no more than five children. In all other instances, remediation is on an individual basis. Normally the pupil is enrolled in a regular elementary school for the majority of his school day and attends the Diagnostic and Remediation Center only for the time he receives specialized assistance. Certain cases receive special attention, including a part-time program at the Center until the pupil has reached a level of development which would enable him to function in a regular classroom experience. Eight professionals are on the staff.

In general, the pupils are statistically evaluated with objective tests on a pretest, posttest schedule and gains and losses in specific areas noted. Other evaluation techniques include subjective statistical evidence. Nonpublic school children are enrolled in the program on a ratio basis. Part of the supporting funds for the Center come from the district; therefore, the Center accepts some pupils from non-Title I schools. For the 1966-67 school year (through May 15), 363 pupils had been referred to the Center, 26 percent of whom were from non-Title I public schools and 8 percent from nonpublic schools.

Health Services to Disadvantaged Children

The Title I School Health Service program was designed to help remove health handicaps preventing full pupil achievement. There are four full-time staff nurses, a half-time medical director, and a half-time secretary for this program. Every contact with a pupil, as far as possible, is made the occasion for furthering his health education. The staff conducts class discussions about desirable and undesirable health habits with a goal of improved personal hygiene for each member of the class. The improvement of health habits is a continuous part of the curriculum.

Nurses work in close cooperation with the principal and faculty of each school. A nurse is often the resource person who locates health literature and materials for the classroom teacher, in some circumstances for example, nutrition education and dental hygiene, and she may come to the classroom to assist a classroom teacher in instructing.

Intergroup Relations

COMMUNITY LIAISON COORDINATOR. The purpose of this service is to develop positive working relationships between the school district and community groups to gain the acceptance, support, and involvement of a broad segment of the community in various Title I programs including the following:

1. Interpreting to community groups the building utilization program which relieves overcrowding in Title I schools in the central area and transfers students to other schools with underutilized classroom space, recruitment and training of monitors on buses which transport these children;
2. In cooperation with the In-Service Education Department, developing and coordinating workshops for school personnel designed to help administrators and teachers work more effectively with the urban disadvantaged child;
3. Providing consultative services to community organizations which have a special interest in education and putting their

services and resources to work in expanding the services provided by Title I programs and other school district programs.

COORDINATOR FOR VOLUNTEER SERVICES. The position of Coordinator for Volunteer Services provides a liaison between the schools and those groups and individuals who are now providing or would like to provide volunteer services to benefit pupils in district schools. Some of the functions of this position include:

1. Recruitment, training, and placement of volunteers in the schools; work with school administrators to determine where the greatest need for these services exist;
2. Establishing new projects to benefit school children in cooperation with volunteer groups;
3. Working with university students and administration to develop tutoring programs in the schools;
4. Representing the school volunteer program both at the national and local levels to various community organizations and to school administrators, principals, counselors, and teachers.

In-Service Education

A workshop on "Teacher Sensitivity to the Culturally Underdeveloped Child" sought to improve the ability of all categories of school personnel to deal effectively with intergroup education problems. Thirty elementary and secondary teachers, each selected by a principal, attended a 1-day orientation workshop and spent 4 days observing and working with a teacher experienced in teaching at "central area" schools where the percentage of children from low-income families is high. A 1-day post-workshop evaluation session followed the 4 days of observation and learning. The workshop required a total of 6 days. Substitute teachers were provided while workshop members were away from their classes.

Work Experience Program

The Work Experience Program conducted by one of the district schools is a project of training and evaluation with financial compensation for mentally retarded pupils (I. Q. s below 75), ages 13-17. The project was designed to meet the need for expanded work-oriented educational opportunities and the need for motivation and the development of positive self-images. The specific objectives are:

1. To discover the work potential of the mentally retarded pupil and determine the degree of independence at which the individual can function.
2. To provide actual work exposure in industry as a means of gaining successful work experience.

Parents are encouraged to visit the school and discuss the program as it relates to their individual children.

All retarded students in the school district who fall within the criteria for admission to this special district school are enrolled in the school's program. (Nonpublic schools do not offer a program for retarded students.) Each of the 80 children involved participates for 3 hours per week for 36 weeks or for the duration of the Title I program.

Neglected and Delinquent Children (NEDEL)

Part of the Title I funds for this district were used for three programs to meet the educational needs of children who reside in three institutions which contract for the care of the neglected or delinquent. The largest program involved upgrading one institution in the areas of mathematics, language arts, and social studies. Some funds were used for the purchase of library books, instructional materials, and audio-visual materials and equipment. The second largest program involved summer enrichment in remedial education, physical education, art and music, and field trips. It involved 40 resident children of both elementary and junior high school ages for a 10-week period. The staff included two full-time teachers, one half-time teacher, and one teacher aide. The program in the third institution was an arts and craft program. It involved funds for one full-time teacher as well as additional equipment and supplies.

1967 Summer Programs

During the summer of 1967, several different educational activities were conducted in the district. These were in addition to the special summer school offered in eight centers in the central area. This 1967 special summer school was similar in many respects to a program carried out in the summer of 1966 with Title I funding, but it was supported by regular district funds. The 1967 program involved more than 1,300 children attending courses in eight central-area elementary schools, four of which were schools contained in our sample of six elementary schools. It involved one class of 24 students at each grade level, kindergarten through 6. Each class was staffed by two or three teachers with one or two aides. Ninety teachers attended half-day classes at the local university as part of the Teacher Training for Integrated Education Institute funded under Title IV of the Civil Rights Act of 1964. Thirty teacher-aides in training were assigned under agreement with an OEO Labor-Department-funded program. The curriculum during this program consisted of instruction for students in arithmetic and language arts and enrichment activities in such areas as art, music, drama, and field trips to places of interest in the community.

LAKESIDE EDUCATIONAL ENRICHMENT PROGRAM (LEEP). For the third successive summer a special program was conducted for about 60 disadvantaged boys from five junior high schools. LEEP was supported by Title I funds. The program concentrated on improving the attitude and motivation of boys about to enter high school in order to increase their interest in going on to college and give them confidence in their ability to do so. Academic work concentrated on English, mathematics, and physical sciences. Athletics and weekend trips of varying lengths were also included. The program ran 6 weeks; its operation was contracted to a separate educational organization.

OTHER SUMMER ACTIVITIES. Several other activities were supported by local compensatory education funds during the summer of 1967. These included the staffing of recreation programs at a local swimming pool, a summer writing workshop involving 30 junior high school teachers, special counseling activities for secondary-school guidance counselors, and additional summer recreation activities.

1966 Summer Programs

SPECIAL SUMMER SCHOOL. During the summer of 1966, District 14 planned and implemented a special summer school program under Title I of the Elementary and Secondary Education Act of 1965. This program was an outgrowth of a pilot effort conducted by the principal and faculty of one elementary school in the spring and summer of 1965. Eleven elementary schools served as educational centers in this project, and a total of 1,750 public and nonpublic school students representing kindergarten through grade 6 participated. All six schools in the TEMPO sample were a part of this special summer program. The program consisted of daily instruction in arithmetic, language arts, and enrichment subjects, and weekly field trips. One hundred seventy-five elementary students were selected from each of the larger schools and 140 students from the smaller schools. Three hundred fifty team leaders (inexperienced teachers and university educational students) and 100 experienced faculty members constituted the teaching staff. Most class instruction was in very small groups, usually of five students.

This program sought to:

1. Improve the academic achievement, attitude, and experience background of the participating students through an innovative instructional program;
2. Provide classroom teaching experience for teachers who would be assigned in the fall of 1966 to teaching the educationally deprived;
3. Provide classroom teaching experience for undergraduate education students;
4. Provide an opportunity for skilled teachers to study, evaluate, recommend, and prepare curriculum materials suitable for teaching disadvantaged children.

The teacher-training aspects of the program were a cooperative venture between the district school system and three area universities. The curriculum study aspect of this project sought to provide a setting in which carefully selected teachers possessing experience and particular skills in teaching educationally deprived children could meet to evaluate the existing teaching materials that were or could be used in the district school system. The instructional aspect was designed to raise achievement levels and to forestall the reinforcement of negative reading factors which often follow the usual "nonreading" habits formed during summer vacation.

SUMMER READING PROGRAM. This project presented an opportunity for elementary school pupils not selected for the special large-scale summer school described above, but in need of additional assistance in reading, to spend the summer reinforcing reading skills through remedial classes, library activities, investigations into good literature, and field trip activities.

SUMMER RECREATION PROGRAMS. This program encompassed a physical fitness and broad recreation program for pupils of both sexes between the ages of five and seventeen residing within the disadvantaged areas.

SUMMER WRITING WORKSHOP. A project was designed to utilize the combined talents of experienced teachers of the disadvantaged and curriculum consultants for the development and writing of instructional materials for the benefit of secondary pupils of the disadvantaged area.

D. ALLOCATION OF COMPENSATORY EDUCATION FUNDS

Since the basic unit for Phase II of this study is the grade in a specific school, that is the level at which resource expenditure information is needed. School districts have traditionally not done an adequate job of collecting or preparing this type of data. TEMPO used the best data available from District 14 as a basis for allocating total Title I expenditures to individual schools and grades. This section describes the methods and results of this allocation process.

Table 24 provides a perspective of the average per-pupil expenditures at the school level, i.e., total expenditures of each sample school divided by its total enrollment (grades kindergarten through 6). From these data it is seen that regular expenditures on a per-pupil basis varied substantially even among the six schools in the sample. Between 1965-66 and 1966-67 these expenditures increased significantly — 7 percent to 35 percent — even before Title I funds were added. Title I per-pupil expenditures for each school are shown for both years. There is no variation in the estimate of Title I per-pupil expenditures for 1965-66 for each of the six schools because they represent the allocation on a per-pupil basis of the total district Title I expenditures for that year. During 1966-67 the financial expenditures were collected on a more detailed basis. Both the regular and the Title I expenditure values for the individual schools cover only funds spent at that school; that is, they do not cover central or administrative functions.

Table 24. Per-pupil expenditures by sample school for regular and Title I programs, 1965-66 and 1966-67 – District 14.

School	Total Enrollment as of Oct. 1		Total Regular Expenditures[a]		Total Title I Expenditure[b]		Allocated Title I Expenditures Salaries Only[c]	Regular Per-Pupil Expenditures[d]		Title I Per-Pupil Expenditures	
	1965	1966	1965-66	1966-67	1965-66	1966-67	1966-67	1965-66	1966-67	1965-66	1966-67
1	636	662	$219,912	$245,776	$64,279	$ 64,213	$30,330	$346	$371	$101	$ 97
2	710	732	216,125	277,377	71,362	55,307	31,000	304	380	101	76
3	825	826	235,276	315,432	83,006	103,159	61,526	285	382	101	125
4	803	866	258,233	323,017	80,900	82,753	59,565	322	373	101	96
5	249	234	115,896	136,093	25,364	20,921	9,430	465	582	101	89
6	819	821	263,775	338,262	82,620	84,603	45,580	322	412	101	103

NOTES:

[a] For year ending June 30, not including major capital or allocated district expenses. Therefore, previous summer is included. Non-Title I compensatory education programs are included here.

[b] For year ending August 30, including capital expenses but excluding allocated district expenses. Therefore, the extensive summer 1966 Title I program is included with 1965-66.

[c] The total for grades kindergarten to 6 of the professional salaries allocated to grades by the process of this study.

[d] For comparison, the district-wide average per-pupil expenditure for elementary schools (excluding capital and interest) in 1966-67 was $557, as stated in the annual report. Both regular and Title I activity would be covered.

[e] These values are equal because the costs for 1965-66 were only collected district-wide, thus necessitating a per-pupil allocation by the District accounting department in order to provide school level costs.

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Allocation Process

The process of allocating costs to the individual grade level is by its nature somewhat arbitrary. Thus, it is important to explain the procedures used by TEMPO to estimate these values. Estimates of the different levels of compensatory educational resources applied to a specific grade were desired so that proper evaluation could be made of that grade's change in achievement level over the same period. In this way an attempt could be made to explain the large variation in changes in achievement. Therefore, it is not so much the absolute level of per-pupil expenditures that is of interest as it is the relative variation among grade levels within and between schools.

While it would be preferable to allocate costs separately for each of the major CE programs, the nature of the CE program in District 14 makes this process impractical. As described in section C, almost all the CE activities that would directly affect the elementary students of these schools were grouped together in one large program called "SCORE." Several other categories (such as diagnostic center, health services, and neglected children) do directly serve small groups of students, but no information is available concerning the specific individuals involved. Another group of activities (such as curriculum development, intergroup relations, and in-service education) serve the teaching staff or the community as a whole, and the effect upon students is probably indirect and delayed. However, there are some parts of the summer programs which do affect some elementary school children directly. Approximately one-fourth of the students of the six sample schools received classroom training during the special 1966 summer program. Unfortunately, we do not have sufficient information to allow allocation of these CE activities to specific classes or grades of students. Except for the summer school, the emphasis in District 14 CE programs was on improving quality of education.

The above factors led to the choice of professional salaries as a basis for allocation of CE expenditures. These salaries represent the bulk of educational expenditures and constitute the primary source of the differential resources expended on the various grades. Most other expenditures are not specific to a given grade and would, therefore, have to be allocated equally on a per-student basis. Although the result of TEMPO's allocation process will not produce a total per-student expenditure per grade that can be directly compared with other districts, the allocation reflects whatever grade-to-grade variation can be gleaned from the available data; thus the data are well suited for the regression analysis to be described in later sections.

The details of the allocation process can best be understood by examining Tables 25 through 30. Each table summarizes the ingredients and results of the process for a particular school for grades 2 through 6. While the later analysis centers on school year 1966-67, the allocation process was carried out for both school years so that changes from year to year could be determined. The same allocation process was applied to the regular instructional program and the Title I program so that they could be compared. Regular teaching expenditures cannot be ignored since they were increasing over this period. It is also possible that some modifications to the number of regular teaching assignments by grade were made because additional Title I personnel were assigned to certain grades. In other words, there might be a bumping or chain reaction effect requiring investigation.

The beginning point for the allocation process was the assignment of teachers and other classroom personnel to individual grades in each school. This information was obtained from the official classification record for each school as of October 1965 and October 1966.* The grades or functions served by assigned Title I personnel were obtained from other records. Personnel not assigned to specific grades (such as counselor, reading improvement teacher, music teacher) were allocated equally to grades 1 to 6 (or to a subset of grades if appropriate). Nurses, clerks, secretaries, and other nonclassroom personnel were not included. Teacher aides (provided only by Title I funds) were kept separate because of their much lower salary levels. From this information, the total effective teaching staff actually serving a particular class (from regular or Title I sources) was estimated. The average salary levels (which were available separately by school) were then used to obtain dollar expenditures. In most cases actual salaries were known for Title I

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*For 1965-66 the additional Title I personnel were assigned starting in January 1966 and, therefore, were not included in the classification record. For the latter year such personnel were included. The data on number of personnel presented in this study reflect the actual number in each period.

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Table 25. Allocation of District 14 salary expenditures to grade level, School No. 1.

Year	Grade	October Enrollment	Regular Classroom Personnel[a]	Title I Classroom Personnel[b]		Regular Cost	Title I Cost[b]	Per-Pupil Cost	
				Teachers	Teacher Aide			Regular	Title I
1966-67	2	92	3.58[c]	1.00	0.34[c]	$25,844	$7,310	$281	$80
	3	80	4.08	1.00	0.34	29,454	7,320	368	91
	4	84	3.58	-	0.34	25,844	1,170	307	14
	5	80	2.58	1.00	0.34	18,625	6,290	233	79
	6	75	3.58	-	0.34	25,844	1,170	344	16
1965-66	2	80	3.50	0.50	0.10	23,450	3,850	293	48
	3	86	3.50	-	0.10	23,450	350	273	4
	4	92	3.50	-	0.10	23,450	350	255	4
	5	69	3.00	0.50	0.10	20,100	3,850	291	56
	6	67	3.00	-	0.10	20,100	350	300	5

Notes:

[a] Personnel stated as full-year equivalents. No summer assignments are included.

[b] Actual salaries for most Title I teachers were known and used in estimating.

[c] Fractional numbers due to some personnel serving more than one grade and some not working a full school year.
Average Teacher Salary: (65-66) $6,700, (66-67) $7,219
Teacher Aide Salary: $3,500

Table 26. Allocation of District 14 salary expenditures to grade level, School No. 2.

Year	Grade	October Enrollment	Regular Classroom Personnel[a]	Title I Classroom Personnel[b]		Regular Cost	Title I Cost[b]	Per-Pupil Cost	
				Teachers	Teacher Aide			Regular	Title I
1966-67	2	91	4.83[c]	-	0.33[c]	$34,780	$1,170	$382	$13
	3	111	4.58	0.25	0.33	32,990	2,670	297	24
	4	96	3.25	0.58	0.33	23,410	4,520	244	47
	5	74	2.25	1.58	0.33	16,207	10,350	219	140
	6	88	3.25	0.58	0.33	23,410	4,520	266	51
1965-66	2	116	4.50	0.17	0.07	30,600	790	264	7
	3	100	3.50	0.17	0.07	23,800	790	238	8
	4	79	3.50	0.17	0.07	23,800	790	301	11
	5	87	3.80	0.17	0.07	25,840	3,170	297	36
	6	71	3.20	0.17	0.07	21,760	790	306	11

Notes:

[a] Personnel stated as full-year equivalents. No summer assignments are included.

[b] Actual salaries for most Title I teachers were known and used in estimating.

[c] Fractional numbers due to some personnel serving more than one grade and some not working a full school year.
Average Teacher Salary: (65-66) $6,800, (66-67) $7,203
Teacher Aide Salary: $3,500

APPENDIX 3

Table 27. Allocation of District 14 salary expenditures to grade level, School No. 3.

Year	Grade	October Enrollment	Regular Classroom Personnel[a]	Title I Classroom Personnel[b]		Regular Cost	Title I Cost[b]	Per-Pupil Cost	
				Teachers	Teacher Aide			Regular	Title I
1966-67	2	84	3.63[c]	0.67	0.58[c]	$29,577	$7,220	$352	$86
	3	87	3.63	0.67	0.58	29,577	7,220	340	83
	4	94	3.00	1.00	0.58	24,444	9,720	260	103
	5	77	3.00	1.00	0.58	24,444	9,720	317	126
	6	75	3.00	1.00	0.58	24,444	9,720	326	130
1965-66	2	99	3.90	0.42	0.17	29,640	3,800	299	38
	3	93	3.50	0.67	0.17	26,600	5,700	286	61
	4	70	2.90	0.17	0.17	22,640	1,900	315	27
	5	70	2.50	0.17	0.17	19,000	1,900	271	27
	6	86	3.50	0.17	0.17	26,600	1,900	309	22

Notes:

[a] Personnel stated as full-year equivalents. No summer assignments are included.

[b] Actual salaries for most Title I teachers were known and used in estimating.

[c] Fractional numbers due to some personnel serving more than one grade and some not working a full school year.
Average Teacher Salary: (65-66) $7,600, (66-67) $8,148)
Teacher Aide Salary: $3,500

Table 28. Allocation of District 14 salary expenditures to grade level, School No. 4.

Year	Grade	October Enrollment	Regular Classroom Personnel[a]	Title I Classroom Personnel[b]		Regular Cost	Title I Cost[b]	Per-Pupil Cost	
				Teachers	Teacher Aide			Regular	Title I
1966-67	2	123	5.33[c]	1.17	0.33[c]	$38,850	$11,370	$316	$93
	3	90	5.33	0.17	0.33	38,850	6,040	432	68
	4	85	4.33	0.17	0.33	31,561	6,040	371	71
	5	89	3.33	1.17	0.33	24,272	11,650	273	131
	6	89	4.33	0.17	0.33	31,561	6,040	355	68
1965-66	2	113	4.67	-	0.10	31,520	350	278	3
	3	89	4.67	-	0.10	31,520	350	354	4
	4	86	3.67	-	0.10	24,773	350	288	4
	5	95	3.67	0.50	0.10	24,773	3,720	262	39
	6	80	3.67	0.50	0.10	24,773	3,720	310	46

Notes:

[a] Personnel stated as full-year equivalents. No summer assignments are included.

[b] Actual salaries for most Title I teachers were known and used in estimating.

[c] Fractional numbers due to some personnel serving more than one grade and some not working a full school year.
Average Teacher Salary: (65-66) $6,750, (66-67) $7,289
Teacher Aide Salary: $3,500

Table 29. Allocation of District 14 salary expenditures to grade level, School No. 5.

Year	Grade	October Enrollment	Regular Classroom Personnel[a]	Title I Classroom Personnel[b]		Regular Cost	Title I Cost[b]	Per-Pupil Cost	
				Teachers	Teacher Aide			Regular	Title I
1966-67	2	43	1.33[c]	1.00	0.17[c]	$ 9,347	$6,430	$217	$150
	3	35	1.83	-	0.17	12,860	600	368	17
	4	36	1.83	-	0.17	12,860	600	358	17
	5	30	1.33	-	0.17	9,347	600	311	20
	6	23	1.33	-	0.17	9,347	600	406	26
1965-66	2	34	1.53	0.50	0.03	9,945	3,360	293	99
	3	37	1.83	-	0.03	11,900	110	322	3
	4	36	1.63	0.50	0.03	10,595	3,360	295	94
	5	24	1.33	-	0.03	8,645	110	360	5
	6	39	2.33	-	0.03	15,145	110	389	3

Notes:

[a] Personnel stated as full-year equivalents. No summer assignments are included.

[b] Actual salaries for most Title I teachers were known and used in estimating.

[c] Fractional numbers due to some personnel serving more than one grade and some not working a full school year.
Average Teacher Salary: (65-66) $6,500, (66-67) $7,028
Teacher Aide Salary: $3,500

Table 30. Allocation of District 14 salary expenditures to grade level, School No. 6.

Year	Grade	October Enrollment	Regular Classroom Personnel[a]	Title I Classroom Personnel[b]		Regular Cost	Title I Cost[b]	Per-Pupil Cost	
				Teachers	Teacher Aide			Regular	Title I
1966-67	2	94	3.83[c]	1.17	0.67[c]	$30,268	$9,305	$322	$99
	3	98	3.83	1.17	0.67	30,268	9,305	309	95
	4	85	3.16	0.84	0.67	24,973	7,700	294	91
	5	103	4.16	0.84	0.67	32,876	7,700	319	75
	6	97	4.16	0.84	0.67	32,876	7,700	339	78
1965-66	2	117	4.50	0.58	0.18	33,525	5,175	286	44
	3	87	3.50	1.08	0.18	26,075	8,900	300	102
	4	87	3.50	0.08	0.18	26,075	1,450	300	16
	5	85	3.50	0.08	0.18	26,075	1,450	307	17
	6	83	3.50	0.08	0.18	26,075	1,450	314	18

Notes:

[a] Personnel stated as full-year equivalents. No summer assignments are included.

[b] Actual salaries for most Title I teachers were known and used in estimating.

[c] Fractional numbers due to some personnel serving more than one grade and some not working a full school year.
Average Teacher Salary: (65-66) $7,450, (66-67) $7,903
Teacher Aide Salary: $3,500

personnel and were used in the estimating process. Per-pupil values were obtained by dividing the expenditure levels for each grade by the appropriate October student enrollment. As is apparent, these estimates did not include any salaries paid for summer activities.

The last two columns of each table present the per-pupil expenditures for both regular and Title I programs for the appropriate school, grade, and year. Any costs other than the included salaries, when allocated, would be constant values added to each of these per-pupil costs for a given school.* The last column of Table 24 shows the result of totaling the 1966-67 Title I professional salaries for grades kindergarten through 6 allocated as described above. This process accounts for 45 percent to 72 percent of total Title I school expenditures. As discussed earlier, these allocations cover only the single Title I project called Elementary SCORE, since it is the only CE activity directly affecting the elementary pupils during the regular school year (it alone accounts for half of the 1966-67 Title I grant). The nature and data of the other Title I activities do not allow similar allocation to the grade level.

E. ANALYSIS OF TREND

As described elsewhere, the existence of a trend in the achievement scores of the pupils of a district could invalidate the conclusion that observed changes in achievement reflect the net effect of compensatory education. If adjustment of the observed data for known trends is feasible, it could serve to improve the estimates of change in achievement due to the introduction of CE.

For District 14, 3 years of comparable test data prior to major CE efforts are available from which to estimate trends. The average, by grade, is probably the best indication of trends, since individual observations might be unduly influenced by irrelevant factors. Figure 6 is a graph of the mean and first-quartile reading scores for grades 3, 4, and 6 averaged over the six

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*Only about 10 percent of the 1965-66 Title I grant was spent for salaries (versus 75 percent for 1966-67). The nonsalary money went for equipment, contract services, and rental of school facilities.

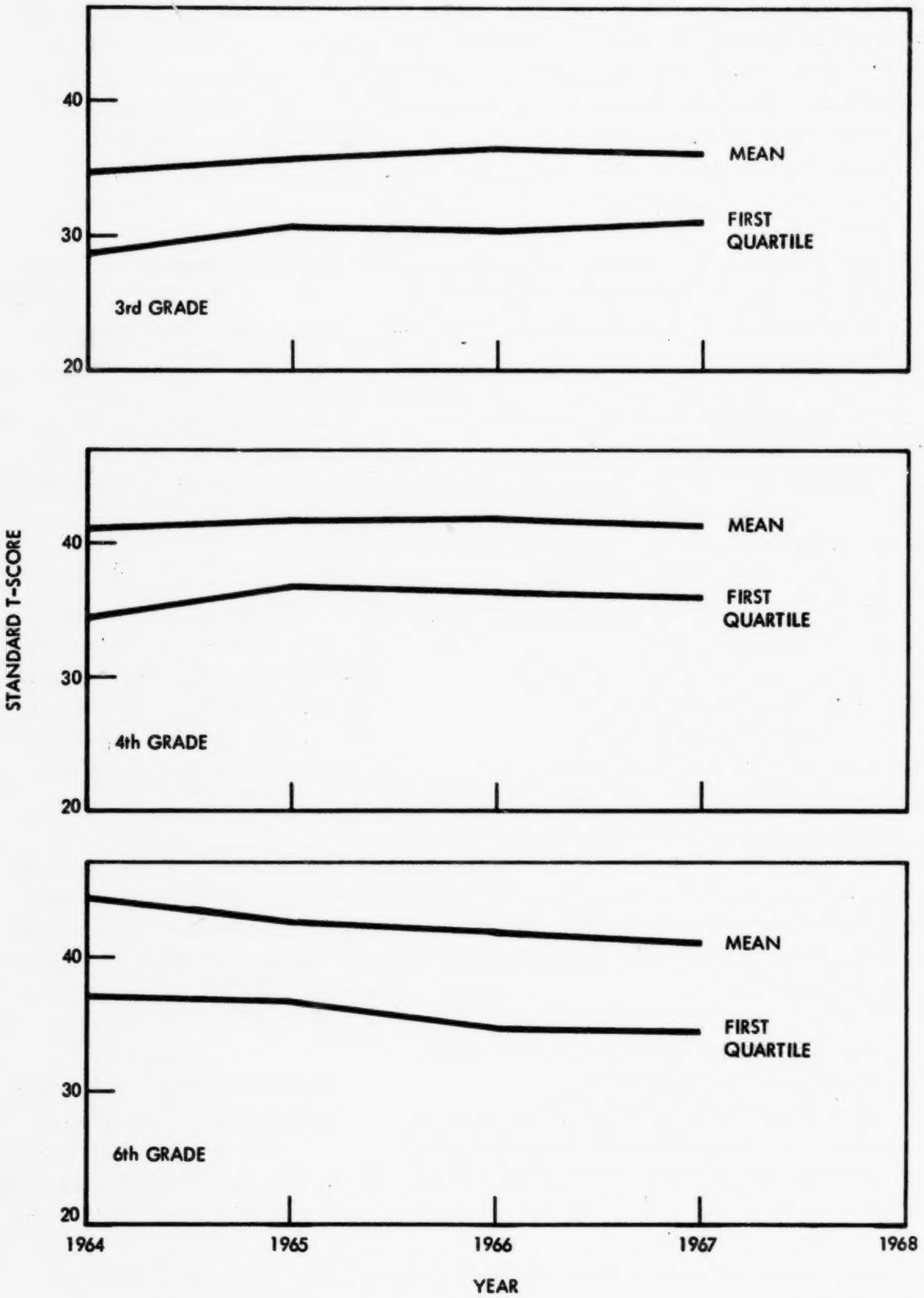

Figure 6. Reading score averages for six schools in District 14.

sample schools.* Since the 1967 tests were obtained after CE had started, only the 3 years 1964-66 are useful for developing a trend. The "post CE" scores for 1967 are shown for general information. Grades 3 and 4 are seen to have had a slight upward trend for both the mean and first quartile measures. Grade 6, in contrast, had a downward trend for both measures.

Figure 7 contains graphs of the reading scores for each of six schools separately. There are no uniform patterns among the six schools for any of the three grades. It is probable that the patterns of change shown in the figure are not meaningful and merely reflect random year-to-year variations.

It is necessary to test the observed changes for statistical significance before attempting any adjustment of test data for trend. By calculating year-to-year changes and the accompanying standard error, it is possible to test the significance of the observed year-to-year changes in test scores.†

For each of the three grades the standard error is very high, compared to the average change in average test score. None of the observed average changes for any of the grades for any sequence of two years is significantly different from zero at the 30 percent significance level based on the t-test. This means that either the trend, if any, is very weak or the random error in these data is preventing a reliable calculation of trend.

We concluded that the empirical evidence at hand does not allow an adjustment to be made to the expected grade average test score. The individual school graphs do not indicate any patterns that would warrant adjustments on an individual school basis. In other words,

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*Test data of individual students were first transformed from raw scores to standard T-scores, and then averaged for each school. Because of the nature of the conversion, it would not be equivalent to first average raw scores and then transform the average scores to standard T-scores. In mathematical terms, the conversion is not a linear transformation.

†A test based on the standard deviations of the year-to-year differences automatically adjusts for the correlation among grade scores in successive years.

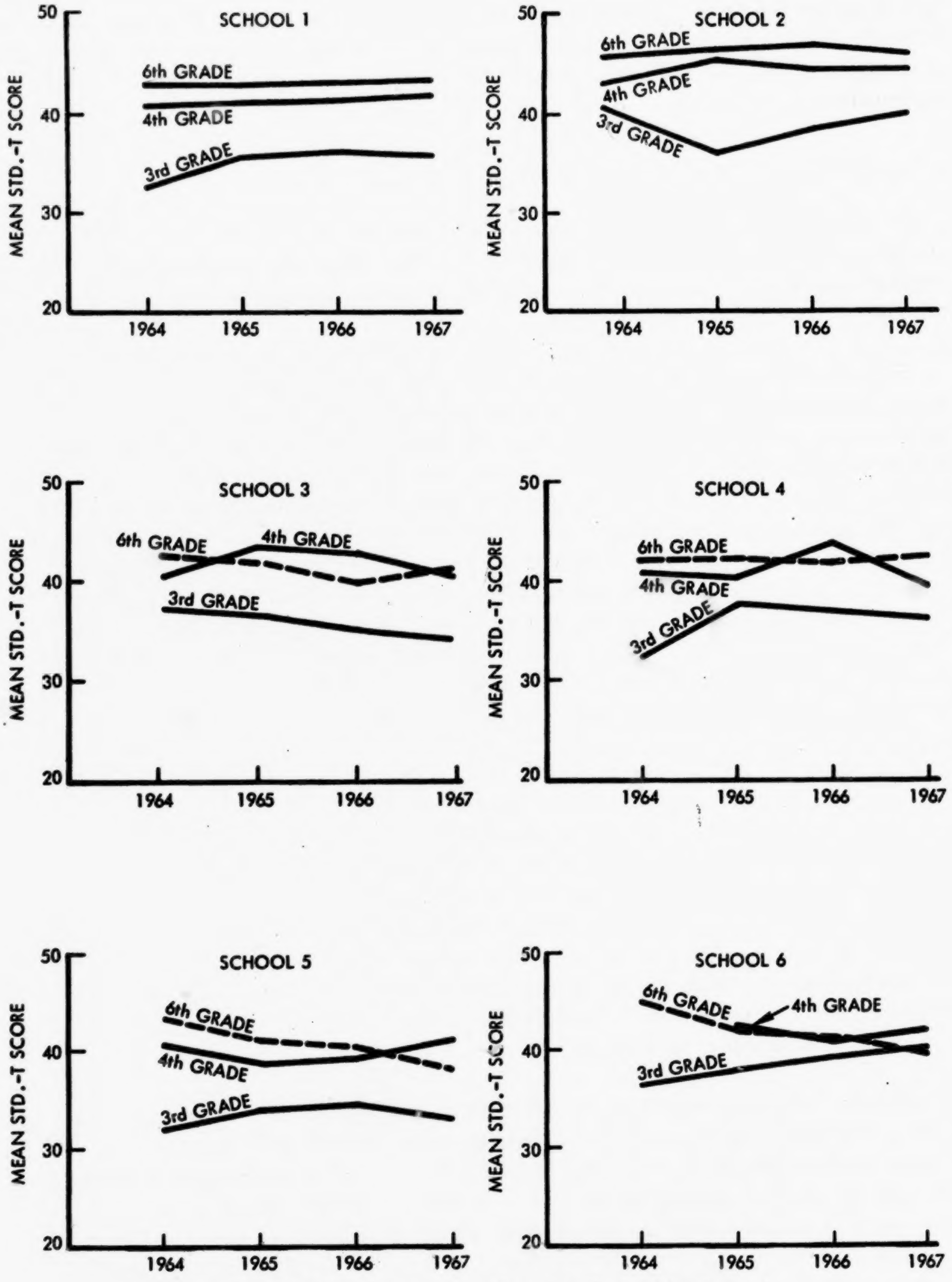

Figure 7. Reading scores for six schools in District 14.

the best prediction for the level of performance in the absence of Title I activities would be the actual performance for the specific grade level in that school just prior to the exposure to Title I projects.

F. DISTINGUISHING FEATURES OF SUCCESSFUL CE

In seeking to investigate what features affect the success of CE programming, it is necessary to first address the question: Has statistically significant enhancement of pupil performance resulted to date from CE programs?

Standardized achievement test results are the only measure of pupil performance available at the grade level. Other potential measures of pupil enhancement (attendance rate, dropout rate, and frequency of disciplinary action) are available only at the school level. During Phase II of this study the achievement test scores for the 18 sample grade units for fall 1967 were obtained and processed. Similar data for fall 1965 and fall 1966 were included in the Phase I study. Figures 8 and 9 present the observed changes in reading achievement scores between 1965-66 and 1966-67 and between 1966-67 and 1967-68. In School 1, for example, Figure 8 shows that the score at the lowest decile for grade 6 decreased by 2.5 units and the mean score decreased by 1.1 standard T-score units.

Between the fall 1966 and fall 1967 testing dates the pupils of the sample schools were exposed to a large-scale Title I program activity (SCORE) during the regular school year and an unknown fraction of these pupils was exposed to a 6-week summer instructional program supported by regular district funds. Between the fall 1965 and fall 1966 testing dates the students were exposed to a small-scale Title I program (which started during the spring semester) along with an extensive special summer school program supported by Title I funds (affecting about one-quarter of the students in the sample schools).

Figure 8 shows that for the sample as a whole there was no tendency toward enhancement of average pupil achievement levels between the 1966 and 1967 fall tests. In fact, the unweighted average change in mean reading scores for these 18 grade units was -0.4 standard T-score units. Since the standard error of the average change was 0.38 standard T-scores, it can be judged to be significantly different from zero only at the 30 percent level of

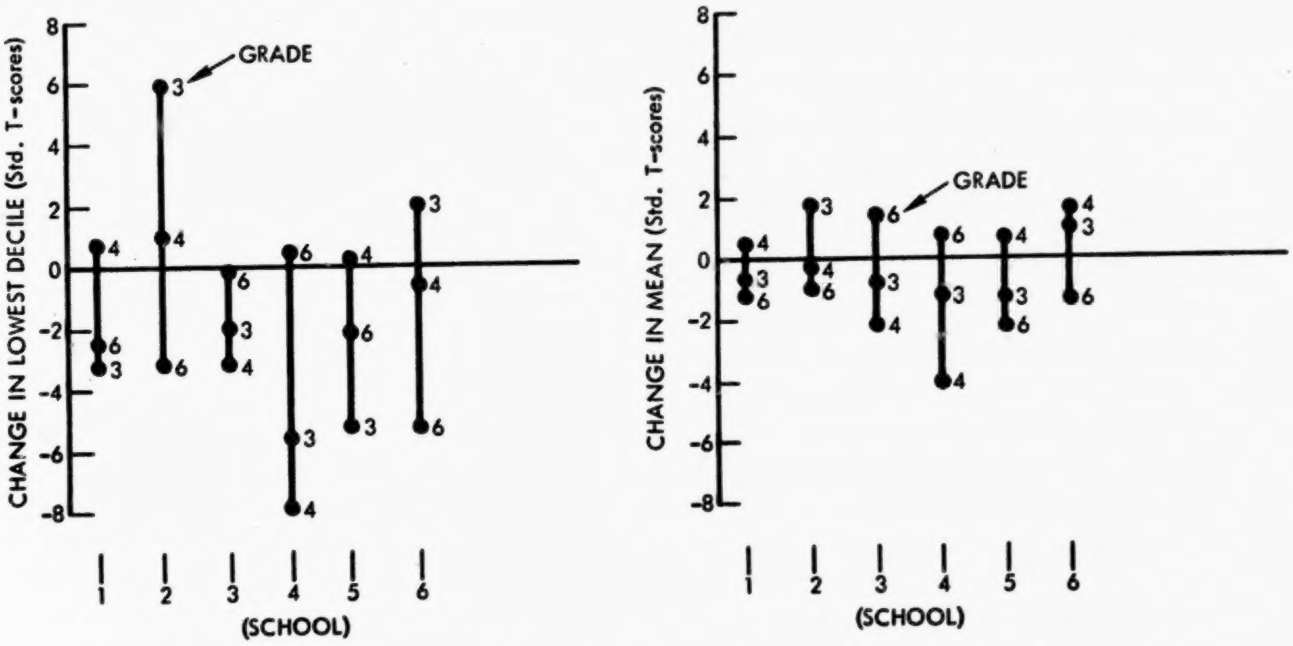

Figure 8. Observed changes in reading achievement level from fall 1966 to fall 1967—District 14.

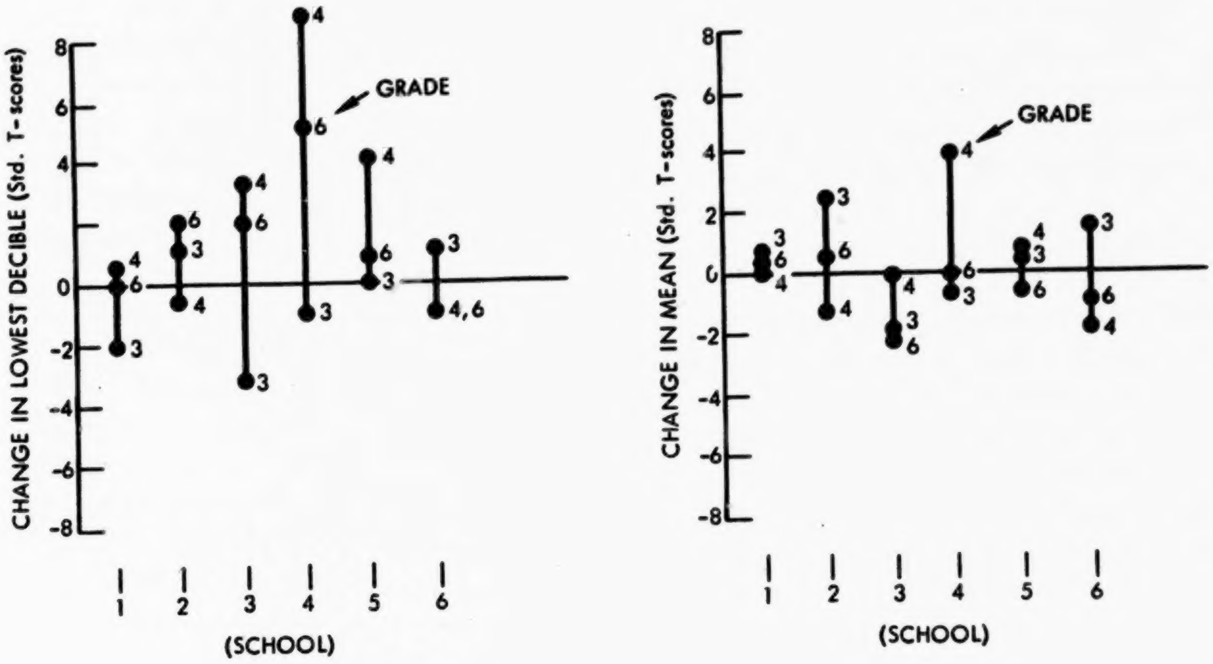

Figure 9. Observed changes in reading achievement level from fall 1965 to fall 1966—District 14.

significance.* In other words, the observed negative change might only represent sampling variation. As seen from the graph, no separate pattern emerges from achievement score changes either for particular grades or schools.

Similar examination should be given to the change in the lowest decile achievement score since the most disadvantaged pupils are at this end of the distribution. Table 31 shows that the unweighted average change in the lowest decile between 1966 and 1967 was a decline of 1.58 standard T-scores. Based on the "t" test, this decline is statistically significant at the 5 percent level. As a result, we must conclude that the reading achievement levels for the pupils in this segment of the class underwent a significant decline over this period even though the pupils were exposed to significant Title I activities.

Table 31 shows the achievement score changes between fall 1965 and fall 1966. During this period, when the pupils actually benefited from very few Title I resources, there was virtually no change in the mean achievement test scores and a significant gain at the lowest decile.

Table 31 also presents estimates of changes in achievement when the respective grade observations are weighted by the average number of pupils who took the test in that grade. Using the weighted observations instead of the unweighted observations produces no change in the above conclusions for either test period.

The conclusion of this examination of pupil achievement at the grade level is that there is no basis for affirmatively answering the question concerning the existence of enhancement of District 14 pupil performance during the period of CE exposure. In fact, the observed changes in achievement were less favorable during the period of extensive Title I activities than they were during the prior year. It has been suggested that these results could be partly due to a downward secular trend in pupil achievement in disadvantaged schools, but the analysis described in Section D produced no firm basis for the existence of a trend in District 14.

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*Two-tailed "t" test with 17 degrees of freedom.

Table 31. Average change in reading test scores in District 14.[a]

Test Interval	Achievement Test Statistic	Unweighted Observations[b]			Weighted Observations[c]		
		Average Change	Standard Error	Significance Level[d]	Average Change	Standard Error	Significance Level[d]
Fall 1966-Fall 1967	Δ Mean	-0.40	0.38	0.30	-0.42	0.37	0.28
	Δ Lowest Decile	-1.58	0.76	0.05	-1.50	0.71	0.05
	Δ Lower Quartile	-0.26	0.50	e			
	Δ Upper Quartile	-0.33	0.55	e			
Fall 1965-Fall 1966	Δ Mean	0.01	0.34	e	0.04	0.36	e
	Δ Lowest Decile	0.95	0.64	0.16	0.88	0.67	0.20
	Δ Lower Quartile	-0.47	0.56	e			
	Δ Upper Quartile	-0.26	0.59	e			

Notes:

[a] In units of Standard T-Scores and based on 1300 pupils in 18 grade units of six schools.

[b] Simple average of the 18 observations.

[c] Average with each sample observation weighted by the average number of pupils who took the pretests and posttests.

[d] Probability that the observed sample result could have happened by chance if the true change over the test interval was indeed zero.

[e] Greater than 50 percent.

CE Program Intensity

It is appropriate to ask to what degree average student achievement should have been expected to increase over this period. Perhaps the students covered by the achievement test data actually received very little Title I aid or perhaps the assignment of Title I resources to certain grades was accompanied by other adjustments to the education program such that an individual student would notice very little net change. There also could have been simultaneous change in school or pupil characteristics, as discussed in Section G. Even though the hoped-for improvement in student achievement apparently did not occur in District 14, it should be beneficial to investigate possible causes for this lack of success.

Probably the most important general variable is the intensity of educational resources actually received by students. It is important to consider the total instructional program. The students themselves are not concerned whether the instruction they receive is supported by funds from state, local, federal, or other sources. Some expenditures help students by providing instructional services in the classroom, others attempt to improve the abilities and knowledge of individual teachers, still others attempt to improve the learning environment in the school, home, and community.

The best indication of the level of intensity of instruction received by students is the amount of teaching resources assigned to the particular grade (including its share of teaching staff shared with other grades). In Section D, salary expenditures for these classroom personnel were allocated to individual grades for both 1965-66 and 1966-67. The per-pupil total of such allocations (combined regular and Title I) for the six sample schools was 18.5 percent higher in 1966-67 than in 1965-66.* Even if regular expenditures alone are examined, an increase of almost 6 percent is observed. Attempts were made by regression analysis to separate the effects of the change in intensity of expenditures and other causes upon the grade level change in achievement. These results, described in Section G, have low correlation coefficients and most regression coefficients are not statistically significant.

In summary, therefore, the observed sample provides no evidence that the level or variation of instructional expenditures affected changes in pupil achievement in these schools. In fact, our best estimate is that per-pupil expenditures were increasing during the period in which student achievement was constant or decreasing.

Another factor which could affect change in achievement is the distribution and type of CE activities. The description of District 14 activities showed that the main program affecting the elementary students in sample schools was the CE program entitled "Elementary SCORE." The curriculum advice and in-service training provided by several other Title I projects presumably improved the effectiveness of classroom teachers. Virtually all expenditures of the elementary SCORE project went for salaries of additional teachers, teacher aides, and clerk-secretaries. Therefore, there is little basis for comparing success of various CE approaches even though it would be very desirable to do so. In order to evaluate the several small Title I projects serving special groups of pupils (such as mentally retarded or delinquent children) it would be necessary to identify the students involved and have longitudinal achievement or psychological data concerning their progress. No such data were found to be available.

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*Comparisons cannot be made with the change in per-pupil expenditures for the district as a whole because of changes in the district accounting system in 1966. Even so, there is no question that the District's total budget and per-pupil expenditures increased significantly during this period.

Evaluation by the District

Various approaches to evaluating compensatory education projects were undertaken by the planning research department in the District central office. While carried out in a somewhat different manner, no significant differences have been observed between the results of this TEMPO study and those of the planning research department. Most of these evaluations were subjective in nature. Heavy use was made of questionnaires to teachers, principals, and sometimes parents or pupils. A majority of the responses were favorable and recommended continuation of the CE projects with only minor modifications. These reactions were confirmed during TEMPO's interviews with the teachers and administrative staff of the District. They seemed convinced that Title I activities were worthwhile in helping students although they could rarely cite any empirical evidence for these conclusions.

A few studies involving the collection and analysis of empirical data were initiated or completed. Several of these studies have contributed valuable baseline data on achievement and intelligence test scores, ethnic background, and other characteristics of the students or community. Comparative information will have to be collected at a later time in order to provide a basis for judging progress. One interesting completed study concerned about 900 elementary school pupils who were bussed from central area schools to outlying schools in the district. This transfer program (some voluntary, some involuntary) was aimed at reducing overcrowding as well as balancing racial distribution. The finances for this program were entirely drawn from local sources and were not part of the Title I program. The follow-up study utilized standardized test scores for three groups—the pupils being bussed, the pupils remaining behind in the schools sending the transfer pupils, and pupils attending the schools which received the transfer pupils but who were originally in those receiving schools. The transfer pupils were considered a treatment group and the latter two groups as control groups. The results after approximately 1 year indicated that the transfer pupils had increased their standardized test scores but were not significantly different from either of the control groups. Moreover, there were no significant differences between past patterns and present patterns of citizenship ratings and there were no differences between the transfer pupils and the control pupils in terms of social behavior standings. All the evidence indicates that the transfer program had not depressed learning among the transfer pupil group relative to the control groups, and that it helped, more than hindered, social behavior and classroom adjustment except in the very beginning months of the transfer program.

A different type of objective evaluation was carried out by a follow-up study of achievement test score changes from grade 4 to grade 6 in four schools receiving total Title I aid and in two schools receiving no Title I aid. The 2-year interval studied (October 1964 to October 1966) included only the first semester and special summer program of the Title I projects. It was longitudinal in nature but included only those students who were in the schools during the full 2-year period. The main question was whether the pupils in the four Title I schools were gaining ground on the pupils in the two non-Title I schools or, in other words, whether the educational gap was closing. As expected, the study showed the Title I schools to be on the low side of district achievement and skill level ranges, with no evidence that the educational and skill level gap between the two groups was closing. In all of the achievement measures the pupils in the two non-Title I schools stayed as far ahead of the pupils in Title I schools in grade 6 as in grade 4. Where one group had gains the other group had gains; where the Title I pupils dropped slightly (but not significantly) the non-Title I pupils did not drop at all.

The district carried out an evaluation as a part of the Title I Special Summer School in the summer of 1966. A sample of pupils participating in the summer school from grades 2 through 6 were administered appropriate achievement tests at the beginning and end of the concentrated 4-week CE program. None of the total groups by grade level showed significant changes between tests for any of the four curriculum areas for which measures were obtained.

There were differences in each case but they could easily have arisen from sampling variation. These results are not unexpected given the short interval involved.

The above discussions have indicated that there has not been enhancement of student achievement accompanying the introduction of CE programs in District 14. Despite the funding of many extra teachers in the elementary schools during 1966-67, there was no significant change in the mean achievement level and there was a significant decline at the lowest decile level. Between the fall of 1965 and the fall of 1966, during which the elementary students were affected very little by the beginning activities of the Title I program, there was no significant change in achievement at the mean but a significant rise at the lowest decile. Based on the criterion of enhancement in student achievement, the Title I programs could not be judged successful. Once that point is established there is no need to pursue the question of the features that distinguish successful CE programs. If instead we use the opinions and subjective judgments of teachers and parents as the criterion of success it could be claimed that the programs were successful. Also, it might be that students benefited from CE programs through improvement in such psychological traits as motivation and self-concept. No attempt was made to measure these psychological characteristics. Critics of this last argument would say that such improved psychological characteristics and a favorable subjective reaction to Title I programs should manifest itself in improved student achievement, although they would admit that a considerable time delay might be involved. In any case, the fact that considerable extra resources were expended on the students whose achievement test progress was being analyzed would lead to an expectation of observing changes if CE expenditures are indeed effective in enhancing achievement.

G. CHARACTERISTICS ASSOCIATED WITH SUCCESS OF CE

The observed achievement scores for individual grades presented in Section F revealed large year-to-year variations among the various grade units tested. Such was the case both for changes in the mean and changes at the lowest decile. It is possible that these observed differences could have been caused by sampling variation or by differences in type and amount of CE. Our analysis showed no differences in the type of CE in District 14 that could be used as an explanation of the large-scale variation. Differences in the amount of resources expended (both CE and regular) were estimated but not found useful in explaining the variation in achievement changes for the respective grades.

Another possible explanation of the variation in grade performance is that school, pupil, and environmental characteristics may have influenced achievement. This section discusses our investigation of this possibility.

The year-to-year changes in grade achievement levels (mean, lowest decile, and lower quartile) were used as the dependent variable in the regression analysis. In the regression models, the following determining variables were used in varying combinations: student mobility, initial mean achievement level, change in attendance, change in regular per-pupil expenditures, change in CE per-pupil expenditures, fractional change in total per-pupil expenditures, and change in percent Negro composition of each school. The observed data which the regression models attempted to explain were arranged to maintain underlying structural relationships. Since the achievement test data corresponded to early fall testing, the pupil characteristics had to correspond to that group. But since their exposure to the educational programs of interest would have occurred the previous school year and summer, it was necessary to use that corresponding data. For example, while the initial level and change of achievement performance for grade 4 in a particular school would be based upon the tests administered in the fall of 1966 and the fall of 1967, the appropriate educational activities and expenditures would be those of grade 3 in the 1965-66 school year and the summer of 1966. The mobility and change of attendance data would also relate to the 1965-66 period but the relevant racial composition data would be for the period represented by the achievement test data. The per-pupil regular and CE expenditures for the appropriate grades resulting from the allocation procedure of Section D were used in the regressions.

The regression coefficients in Table 32 show the expected change in achievement for a unit change in each of the determining variables. For example, in Model 1 the regression coefficient of -0.126 suggests that a decrease of one standard T-score in preachievement is associated with a change of +0.126 in the mean. Four different models* are used for showing how changes in achievement might be explained by changes in both state-of-condition variables such as

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*Rationale and description of the four models are given in Section C, Appendix 6.

Table 32. Estimated regression coefficients for models described in Appendix 6—District 14.[a]

Model Number	Dependent Variable	Constant Term	Determining Variables									
			M_i	$(M_i-\overline{M})$	X_i	$(\overline{X}_i-\overline{X})$	ΔAtt	$\Delta\$$R	$\Delta\$$CE	$F	ΔNeg	R^2
1:	$\Delta\overline{X}$			-0.020		-0.126	0.463	0.010	0.006		0.370	0.27
				(0.024)		(0.178)	(0.468)	(0.008)	(0.013)		(0.235)	
	ΔD_1			-0.041		0.088	0.912	0.027^b	-0.009		0.701	0.49
				(0.045)		(0.323)	(0.848)	(0.014)	(0.023)		(0.426)	
2:	$\Delta\overline{X}$			-0.009		-0.117				0.450	0.276	0.15
				(0.018)		(0.176)				(1.36)	(0.188)	
	ΔD_1			-0.029		0.076				-0.854	0.608	0.17
				(0.039)		(0.377)				(2.90)	(0.403)	
3:	$\Delta\overline{X}$	-15.7	0.207		-0.179		-5.00	0.010	0.010		-0.720	0.32
			(0.186)		(0.180)		(4.46)	(0.008)	(0.013)		(0.914)	
	ΔD_1	-30.9	0.267		d		-6.49	0.028^b	0.002		-0.773	0.40
			(0.325)				(7.78)	(0.014)	(0.023)		(1.60)	
4:	$\Delta\overline{X}$	5.03	d		-0.140					3.10^b	0.280^b	0.27
					(0.159)					(1.82)	(0.150)	
	ΔD_1	-2.48	-0.006		d					6.60^b	0.637^b	0.30
			(0.033)							(3.60)	(0.328)	

Notes:

[a] Variables are defined as: $\Delta\overline{X}$, ΔD_1 = Change in mean and lower decile reading achievement measured in standard T-scores; M_i = % mobility; $(M_i-\overline{M})$ = difference between mobility in school i and sample average for district, Δatt = Change in % attendance rate; $\Delta\$$R = Change in expenditures for regular teachers; $\Delta\$$CE = Change in expenditures for CE; $F = ($\Delta\$$R + $\Delta\$$CE) ÷ ($R pre + $CE pre). For further details, see Appendix 6. The estimate of standard error is shown in parentheses below the respective regression coefficient.

[b] Significant at 10 percent level.

[c] Significant at 5 percent level.

[d] Not included in final regression equation because F values in the final test for significant reduction of residual variance was less than 0.005.

preachievement level and resource variables such as expenditures for CE. Conclusions drawn by TEMPO are based on a summary of the coefficients in all four models since there is no definite way of selecting one model over the others.

One way to judge the quality of the estimated relationship is to examine the significance of the regression equation as a whole. This can best be done by examining the respective R^2 value (coefficient of determination) which expresses the fraction of the variation in the observed data that is "explained" by the independent variables that are included in that regression equation. As shown in Table 32, values for R^2 from the equations estimated are not high—they range from 0.15 to 0.54 with only two having values greater than 0.40. Moreover, the statistical significance of the estimated equations is very low—in none of the equations is the percentage of variation statistically significant at the 5 percent level. Another method for judging the quality of the estimates is to examine each coefficient separately based on its respective standard error. As shown in Table 32, only four coefficients in a total of eight equations were statistically significant at the 10 percent level.

The poor quality of the estimates derived from the regression process directly reflects the large variation and few observations. Further, for three of the determining variables (mobility, attendance rate, and racial distribution) the data were only available on a school basis, thus reducing those variables to only six different values.

Each of the variables that might have affected changes in achievement are discussed in the following paragraphs.

Grade

It is possible that the grade level of the students would affect the benefits received from compensatory education due, perhaps, to certain learning levels being more susceptible to remediation. Achievement changes for both years presented in Figures 8 and 9 reveal no tendency for achievement gains or losses to be associated with particular grades. For example, grade 6 from fall 1966 to fall 1967 had achievement gains in three schools and achievement declines in three other schools. Simple correlations between changes in achievement and grade level are mostly small and negative but the results were not statistically significant. Possible effect of grade level was studied in the regression analysis by relating the error component (i. e., the variation not explained by the included regression variables) to grade level. There was no evidence that changes in achievement were related to grade level.

School

It is possible that the differential gains in achievement could be related to the special characteristics or learning environment within a particular school. Examination of Figures 8 and 9 indicates no such pattern; that is, an individual school usually has some of its grades gaining and at the same time one or more grades declining in achievement.

Mobility

Student mobility was included as a variable because it could serve to dilute or negate the positive effects of CE activities. Five sample schools in District 14 have relatively high student mobility, and one has relatively low student mobility. The simple correlation coefficients are low and not statistically significant. With the exception of Model 3 all the regression coefficients for mobility are negative but not statistically significant.

Mean Reading Achievement Level at the Beginning of Title I Programs

Because of the objective of CE programs, it might be expected that emphasis would be directed toward students at the lower range of achievement test scores. Therefore, it would be natural to expect a negative correlation between change in achievement level and original achievement level. As discussed in the Phase I report (Reference 43), this interpretation must be qualified by the possibility of a built-in correlation due to statistical regression between original levels of a variable and changes in that variable from one time to another (particularly for the mean change in achievement). Contrary to the overall results of Phase I, both the correlation coefficients and the regression coefficients for District 14 did not show statistically significant relationships with the average initial achievement levels. The simple correlation coefficients between average initial achievement level and $\Delta \overline{X}$, ΔD_1, ΔQ_1, and ΔQ_3, respectively, were -0.15, 0.07, -0.18, and -0.26. None of the eight regression coefficients for average initial achievement level remaining in the final regression equations was statistically significant, although all but two were negative. For District 14 these mixed results could be attributed to two factors: first, the high sampling variation and, second, the fact that the CE programs for this district served all students in the Title I schools and provided very little extra remediation for special problem students. In any case the lack of significant relationships precludes saying anything positive about this variable.

Level and Change of School Attendance Rate

As disclosed by the ranking discussed in Section B, the six sample Title I schools had a very poor attendance record relative to other elementary schools in District 14. Although there were shifts, these schools maintained their relatively poor position from year to year. It has been suggested that the change in achievement accompanying the introduction of CE programs could be a function of the level of attendance in that school. For District 14, the simple correlations between the various measures of achievement and the mean school attendance rate prior to CE were all positive but not statistically significant.*

It has also been suggested that the change in attendance rate between the pre-year and the post-year could affect the change in achievement. The attendance rate for all six sample schools declined from 1965-66 to 1966-67 but the district-wide mean for elementary schools was also declining significantly. The correlation coefficients between change in attendance rate and the various changes in achievement measures were low (none higher than 0.16, half positive and half negative, and none significantly different from zero). Change in attendance rate was one of the independent variables used in the regression equations. The regression coefficients estimated from the sample data were half positive, half negative, and none was statistically significant at the 10 percent level. In summary, there does not appear to be any clear relationship between change in attendance rate and change in achievement scores.

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*The correlations of school attendance rate in the fall of 1965 and $\Delta \overline{X}$, ΔD_1, ΔQ_1, and ΔQ_3, respectively, were 0.27, 0.31, 0.24, and 0.18.

Level and Change in Percent Negro

Several studies have suggested or observed a close inverse relationship between the racial composition of a student body and its achievement performance (e. g., Reference 9, the Coleman Report).* The percentage Negro variable in District 14 was 4 percent in one school, and the other five schools were spread over the range of 32 percent to 96 percent. These six data points provide little basis for conclusions either way. The correlation coefficients between percentage Negro in the pre-year and the four measures of change in achievement were mixed in sign, low, and not statistically significant.

Attention has also been focused on the change in percentage Negro occurring in the schools since it is often suggested that a large racial transition is associated with reduction in school achievement levels. The six sample schools had changes about equally divided in direction but none of the changes represented substantial shifts in the racial composition of the schools involved between the pre- and post-years (the largest change represented only 5 percentage points). The correlation coefficient between the change in percentage Negro and the four measures of achievement change were all positive and ranged from 0.31 to 0.43. These coefficients were not statistically significant. The change in percentage Negro was also one of the independent variables utilized in the regression models. Models 1, 2, and 4 resulted in positive regression coefficients for change in percentage Negro, with three of the six coefficients being statistically significant at the 10 percent level. Model 3 resulted in nonsignificant but negative regression coefficients. Even though these results are better than those for other determining variables used in the regression analysis, they do not present a consistent picture that would allow meaningful conclusions.

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*This TEMPO study observed a -0.6 correlation between the percentage of Negro students in a school and the level of reading achievement.

APPENDIX 4

DESCRIPTION AND ANALYSIS OF DISTRICT 12

A. SUMMARY

Except for a special CE evening class activity conducted in three of the 194 public schools in District 12, there was only one CE activity. This was centered on language development and oriented toward grades 1 through 3. The increase in per-pupil expenditures as a result of the language development activity was significant. In 1966-67, the average CE grade 3 pupil expenditure in the four sample schools selected varied from $161 to $368. This amounted to increases ranging from 50 percent to 95 percent over the expenditures for regular classroom teachers.

The average changes in the lowest decile and mean achievement level between the tests given in fall 1966 and fall 1967 were both negative in the four sample schools. However, the sampling variation is so large that the results are not statistically significant.

When the variation in change in achievement among the four sample schools is related to per-pupil expenditures (for both CE and classroom teachers) there is some evidence that achievement level is affected by amount of resources. The school with the largest increase in CE, and the highest level of total per-pupil expenditures was the school that showed the most favorable change in reading achievement.

Attempts to identify state-of-condition variables that are associated with change in achievement and distinguishing features of successful CE activities were unsuccessful. This lack of success should not be accepted as strong evidence that no such relationships exist, since the four sample observations are too few for definitive analytical results.

B. SAMPLE SCHOOLS AND THEIR CHARACTERISTICS

The District 12 school system, serving about 120,000 pupils, is the second largest system in its state. As part of a large and growing metropolitan area it has experienced very substantial growth during the past decade with a heavy demand upon existing capacity in the schools. Continuing, but less dramatic, growth has occurred in the remaining, predominately rural areas of the county. Like many others, this school system has found it difficult to meet these growing demands. Few schools in the system have idle classrooms and many classes in the schools are larger than considered desirable.

Eligibility of schools for Title I programs was established by the low-income criterion of ESEA and other descriptors as indicated below. School administrators found it necessary to rely heavily on 1960 census data, supplemented by information available within the county government and the school system. Among the poverty indicators employed were family income, housing conditions, education of parents, families receiving welfare aid, value of homes, and employment. With these data, schools were ranked by census tracts in order of indicated concentrations of poverty.

After discussing the objectives of this study with the Operation Moving Ahead (OMA) project coordinator, four schools were selected from the 16 elementary schools eligible for Title I, ESEA projects. These were chosen to represent the range of variations in each of the several indicators. Table 33 summarizes the characteristics of these sample schools, which represent both the rural and urban/suburban areas of the county and the range of pupil enrollment in the Title I schools.

More than 25 percent of the 1,910 pupils participating in the OMA project in the spring of 1966 were enrolled in the sample schools.

C. TYPES OF CE ACTIVITIES

To achieve a prompt and orderly beginning of compensatory education, school administrators defined a single, countywide program (Operation Moving Ahead) for eligible elementary schools. This program stresses language arts development and employs a mix of resources with central program management. The project has had the enthusiastic support of teachers and staff.

Table 33. Sample school characteristics, 1965-66—District 12.

School Characteristics	School Number			
	1	2	3	4
Median family income of pupils attending school:				
Income (county median $6,664)	$2,906	$4,813	$6,120	$4,115
Relative rank[a]	4	10	22	7
Mobility (%)	16	10	27	23
Aid to families with dependent children:				
Percentage of families aided (1965) (county median 0.95%)	6.2	5.0	4.4	13.6
Parent education				
Median years completed (county median 12.1)	8.0	10.5	10.6	8.7
Relative rank[a]	4.5	14	5.5	6.5
Negro pupils (%)	56	100	66	100
Spanish-speaking pupils (%)	O	O	O	O
School location (rural/urban)	R	U	R	U
School enrollment (fall)	175	694	398	757
Pupils Participating in OMA Project (from grades 1 through 3, June 1966)	42	175	178	290

Note:

[a] The rankings given are relative to 74 sub-areas into which the school district is divided. The highest values have the highest rank.

A second activity (Operation REACH) was established for one specific community in the form of evening classes offered at one elementary, one junior high, and one senior high school.

The two activities for 1966-67 are summarized in Table 34 and discussed subsequently. This was the first full year of Title I activity and since the test data are from fall tests, TEMPO focused its analysis on the 1966-67 activities.

APPENDIX 4

Table 34. Activities in the District 12 Title I project, 1966-67.

Short Title & Description	Expenditures	Target Group
Operation Moving Ahead. Places emphasis on language arts development. Several types of aids, analysts, and specialists to help regular teachers.	$588,167	2,074 pupils in grades 1 through 3 in 16 schools.
Operation REACH. Consists of voluntary classes for pupils and parents. Emphasis on language arts and study skills.	$102,292	160 pupils in grades 1 through 6, 190 pupils in grades 7 through 12, 75 dropouts or adults.

Operation Moving Ahead (OMA) Activity

To meet the stated purpose of providing for educational needs of educationally deprived children, the following objectives were formulated:

1. To improve the ability to listen discriminately to the standard language of the culture and thereby have more confidence that one has heard correctly;
2. To improve the ability to speak the standard language clearly and fluently, facilitating interpersonal communications and allowing richer expression of one's feelings;
3. To improve reading skills, such as word recognition, word analysis, and comprehension, as a basis for deriving greater enjoyment from reading and feeling the satisfaction of reading books in areas of one's special interests;
4. To improve the ability to write legibly in acceptable form as a means of transferring thoughts to paper appropriately and expressively;
5. To provide the educationally deprived child with an instructional program adjusted to his level of ability which, in addition to being more efficient because the child will be able to participate productively in learning tasks, will give him the experiences of success essential to his gaining self-confidence;

6. To provide a continuous in-service program for the teachers and the teacher aides in the project in order to increase their knowledge and understanding of the special needs of the educationally deprived child;
7. To provide the necessary services and materials for correcting physical deficiencies which may be hampering the child's educational development;
8. To provide a health education program that will give the child the knowledge of how to care for his body.

In essence, there was an "educational goal" of improvement in pupils' language skills and a "social goal" of improvement in pupils' self-concept and increased opportunities for success. The OMA activity made extensive use of full-time "Children's Aides," "Helping Teachers," and other personnel, to identify educationally deprived children and to meet their needs, especially in the area of language arts, through individual diagnosis and individual or small-group instruction. Personnel employed included:

	1965-66 (March-June)	1966-67
Children's Aides	73	92
Parent Helpers	--	18
Helping Teachers	7	7
Social Workers	4	5
Psychologists	1	2
Research Analyst	--	1
Supervisor	1	1
Other (including clerical)	2	4
Totals	88	130

The school system's administrators decided to focus on use of children's aides rather than on employing many more teachers or reading specialists, or attempting to reduce class size from the present sizes of 30 to 35 pupils, because of the lack of space in schools and difficulties of obtaining qualified reading specialists.

Children in 16 eligible schools participated in the project. Participants in each school were identified through teacher observation and standardized testing. Children were selected who scored substantially below grade level or whom teachers identified as needing additional help to attain achievement levels comparable to those of other children of their age and ability. Continuous planning and evaluation were an important part of a team effort by principals, helping teachers, classroom teachers (employed under the regular school program), and aides. Each week, Helping Teachers met with the classroom teachers to determine each child's specific needs and to plan activities which could be done by the children's aides to meet these needs. They also met with the aides, planning their week's work with them and training them to use materials or to carry on specific activities suggested by the classroom teachers. Within the general framework of improvement in language arts, greater emphasis was placed upon identifying and meeting individual children's needs than on subject matter.

Aides were assigned to about 160 classrooms in grades 1, 2, and 3 in 16 schools. In most cases, an aide worked with two teachers; sometimes an aide was assigned to only one classroom. Where possible, children were separated from the class (in groups of 1 to 8, but usually about 4) for two to four periods per day of 20 minutes each to work with an aide. Children stayed in OMA for the full school year or for shorter periods, as their needs indicated.

Children whose nonschool needs affected their progress in school were identified and referred to a social worker, school nurse, or psychologist for further help. Parents of OMA children received assistance from part-time (15 hours a week) parent helpers (19 in 1966-67) in learning about the school, the growth and learning of children, home management, and community resources.

Examples of special educational activities or services provided are "listening posts" (tape recorders used by small groups of pupils supervised by teachers, aides, or librarians); language kits; discussion groups; use of functional toys and games; extensive use of library and library materials, with reading specialists working with teachers and teacher aides in using techniques for diagnosing and remedying reading problems; and field trips.

In all cases, both aides and teachers participated in the instructional activities. Emphasis was placed on the instructional role of the aides, under guidance of the helping teacher, especially in language arts. The project also included instruction in health education, physical education (with "emphasis on improved motor coordination and perceptual skills"), and services for correction of physical or dietary deficiencies. Free lunches were provided to participating children.

The project training program included a pre-project workshop for principals, head teachers, and aides; continuous in-service training; and a post-project workshop during June "for all personnel to evaluate and rewrite the program in relation to deficiencies and objectives."

Operation REACH Activity

Operation REACH (Raising Educational Achievement of Child and Home) was designed to meet specific needs in one community. The objectives with respect to school age children were to provide an adequate place in which to study and learn after school hours, to provide guidance and help in learning to broaden the cultural background of the students and adults in the area, to make wiser use of leisure time, and to satisfy parental concerns about channelling activities of their children into something constructive and educationally sound. The objectives with respect to adult participants were to help parents understand and guide their children, to enable parents to learn skills which would improve earning capacity, and to provide a program which would help parents engage in activities with their peers without feelings of inadequacy and insecurity. Teachers and aides (usually parents) were employed to conduct evening Operation REACH classes in three schools serving the community.

The 1966-67 staff included 35 teachers and 25 aides. Teachers were appointed on a ratio of 1 to 15 in elementary grades and 1 to 5 in secondary classes. An aide was assigned to each elementary teacher and three aides to the group of secondary teachers. Two pupil personnel workers participated two nights a week by visiting homes. The County Health Department examined children at the school on one evening a week, with referrals and follow-up to correct any cultural and recreational deficiencies.

In 1966 (March 1 to June 10) and in 1966-67, the project provided classes for students in kindergarten through grade 4 for one and one-half hours two evenings a week, and for students in grades 5 through 12 for two hours two evenings a week. Adults met for two hours once a week. Children were served a light meal. Student participation in the project was voluntary.

Emphasis of the project was on language arts and study skills, but without a set curriculum. Each teacher had considerable freedom to use innovations that might stimulate children who could not respond to usual classroom activities. Students were encouraged to help in planning their activities. The pupils in the community where this activity was conducted did not participate in the other Title I funded activity (OMA).

D. ALLOCATION OF FUNDS FOR CE

Table 35 shows the total per-pupil grade 2 expenditures for the sample schools. Since the grade 3 achievement scores which were analyzed in this study were obtained in the fall, any enhancement of achievement from CE activities would have resulted from grade 2 programs. Although the level of the CE activities in both 1965-66 and 1966-67 was about the same, the expenditures for the earlier year are less because it was in operation for only three months. A comparison of the 2 years for OMA is shown in Table 36.

Table 35. Per-pupil expenditures for grade 2 sample schools — District 12.[a]

School	1965-66		1966-67	
	Teachers in Regular Program	CE	Teachers in Regular Program	CE
1	$331	$120	$383	$368
2	246	110	214	143
3	252	110	257	161
4	326	110	319	167

Note:

[a] Expenditure for teachers and aides based on average salary for each throughout the District. The same average was used for both years.

Table 36. OMA activities, 1965-66 and 1966-67 – District 12.

Extent of CE	1965-66 (March-June)	1966-67
Total Schools Served	16	16
Sample Schools Served	4	4
Total Pupils Served	1,910[a]	2,074[a]
Total Expenditures	$193,827	$588,167
Expenditure Per Pupil	$101	$284
Exposure	1 hour per day (60 hr total)	1 hour per day (150 hr total)

Note:

[a] For 1965-66 this is a minimum figure. Since some children were in the program for less than the full period, the total number actually served is probably greater than indicated. Also, about 300 parochial school pupils participated in some parts of the program in 1966-67.

Except for operation REACH, which was only one-seventh of the total expenditures, all of the CE activity was oriented toward grades 1 through 3. As shown in Table 35, the per-pupil CE expenditure for all grade 2 pupils in the 1966-67 program sample varied from $143 to $368. Compared to the expenditure for teachers in the regular program this amounted to an increase of 50 to 95 percent.

In many Title I schools across the country less than 20 percent of the pupils in a grade actually received the benefit of CE activities. However, as shown in Table 37, the pupil participation rates in the sample schools of District 12 were noticeably greater than 20 percent.

E. ANALYSIS OF TREND

The available data for the four sample schools over the period 1963-67 shows no evidence of a systematic trend. None of the three measures—highest decile (D_9), mean ($\overline{X}$), and lowest decile (D_1)—for the schools shown in Figure 10 shows any systematic downward trend.

Table 37. Pupil participation in the OMA project – District 12.

School	Grade	1965-66			1966-67		
		Total Pupils	OMA Pupils	Percent Partic.	Total Pupils	OMA Pupils	Percent Partic.
1	1	26	15	58	32	12	38
	2	25	20	80	25	12	48
	3	26	13	50	30	16	53
2	1	120	72	60	156	116	74
	2	120	80	67	149	106	71
3	1	108	68	63	106	61	58
	2	96	67	70	103	64	62
	3	84	43	51	90	67	74
4	1	175	104	59	152	82	54
	2	127	119	94	151	122	81
	3	126	67	53	111	75	68
	Totals	1123	735	65	1196	795	66

There are too few observations to draw any reliable conclusions on the absence of trend. On the other hand, there is no evidence for making an adjustment for trend in estimating the effects from CE.

F. DISTINGUISHING FEATURES OF SUCCESSFUL CE

The only feature of CE activities in District 12 that lends itself to analysis is expenditure level per pupil. Table 38 shows changes in achievement for 4 one-year periods beginning with 1963, even though TEMPO's analysis centered on CE in 1966-67 which would only be reflected in the change from 1966 to 1967. No regression model was formulated because there are only four observations for developing estimates of coefficients.

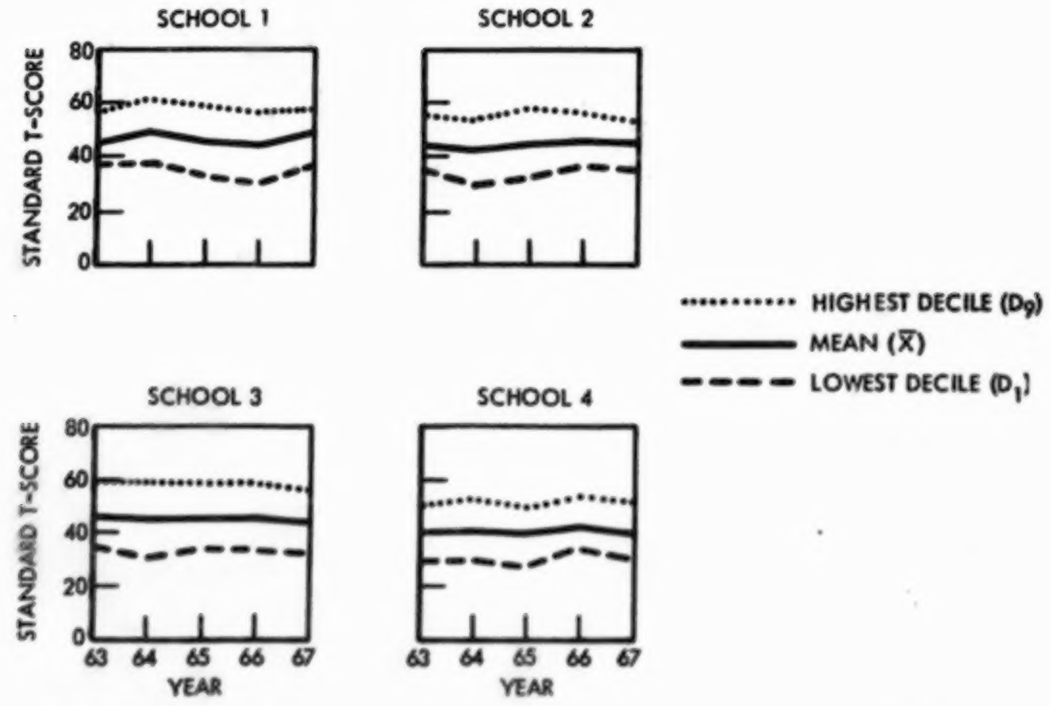

Figure 10. Mean reading score for Grade 3, four schools in District 12.

Table 38. Changes in standard T-score achievement over selected intervals for four sample schools – District 12.

Period	School 1					Period	School 2				
	D_1	Q_1	$\bar{X}$	Q_3	D_9		D_1	Q_1	$\bar{X}$	Q_3	D_9
1963-1964	+0.7	+1.8	+3.9	+3.3	+5.0	1963-1964	-7.3	-2.9	-2.6	-1.4	-1.8
1964-1965	-5.5	-2.0	-3.6	-3.0	-2.5	1964-1965	+3.9	+1.1	+1.9	+3.6	+4.9
1965-1966	-3.0	-1.3	-1.4	+0.4	-3.0	1965-1966	+4.0	+1.8	+1.4	-2.1	-1.7
1966-1967	+6.2	+5.4	+4.2	+1.9	+0.5	1966-1967	-1.7	-0.5	-1.8	-1.3	-3.1

Period	School 3					Period	School 4				
	D_1	Q_1	$\bar{X}$	Q_3	D_9		D_1	Q_1	$\bar{X}$	Q_3	D_9
1963-1964	-4.9	-0.3	-1.3	0.0	0.0	1963-1964	0.0	-1.7	-0.5	-0.7	+3.2
1964-1965	+3.2	-0.4	-0.2	-0.8	0.0	1964-1965	-2.8	-0.8	-1.2	-0.7	-4.3
1965-1966	+1.0	+0.1	+0.7	+2.0	0.0	1965-1966	+6.8	+3.7	+3.0	+1.2	+4.9
1966-1967	-2.0	-2.4	-2.1	-2.5	-2.0	1966-1967	-4.0	-1.6	-1.9	-2.1	-2.0

The average change in the mean and the lowest decile between the 1966 and 1967 tests for the four schools is negative, but neither change is statistically significant. When each of the four observations is weighted by the number of pupils involved, the averages become more negative; however, as shown in Table 39, the averages are still not significantly different from zero. The graphs in Figure 11 are presented to show if the variation among schools can be attributed to differences in level of per-pupil expenditures. The points on each of the two graphs look very similar because most of the change was in expenditures for CE. Two observations stand out in the graphs of Figure 11. First, the only gain occurred in the school with the largest increase in per-pupil expenditure. Second, the results for the other three schools (2, 3, and 4) indicate no relation between per-pupil expenditure and change in achievement.

Table 39. Average change in achievement from 1965-66 to 1966-67 for four observations in District 12.[a]

Measure of Achievement	Unweighted Observations[b]			Weighted Observations[c]		
	Average Change	Std. Error	Signif. Level[d]	Average Change	Std. Error	Signif. Level[d]
Δ Mean	-0.40	1.53	e	-1.20	1.05	e
Δ Lowest Decile	-0.38	2.25	e	-1.76	1.61	e
Δ Lower Quartile	-0.23	1.77	e			
Δ Upper Quartile	-1.00	1.00	e			

Notes:

[a] In units of standard T-scores and based on 330 pupils in 4 grade units of 4 schools.

[b] Simple average of the 4 observations.

[c] Average with each sample observation weighted by the average number of pupils who took the pretests and posttests.

[d] Probability that the observed sample result could have happened by chance if the true change over the test interval was indeed zero.

[e] Greater than 50 percent.

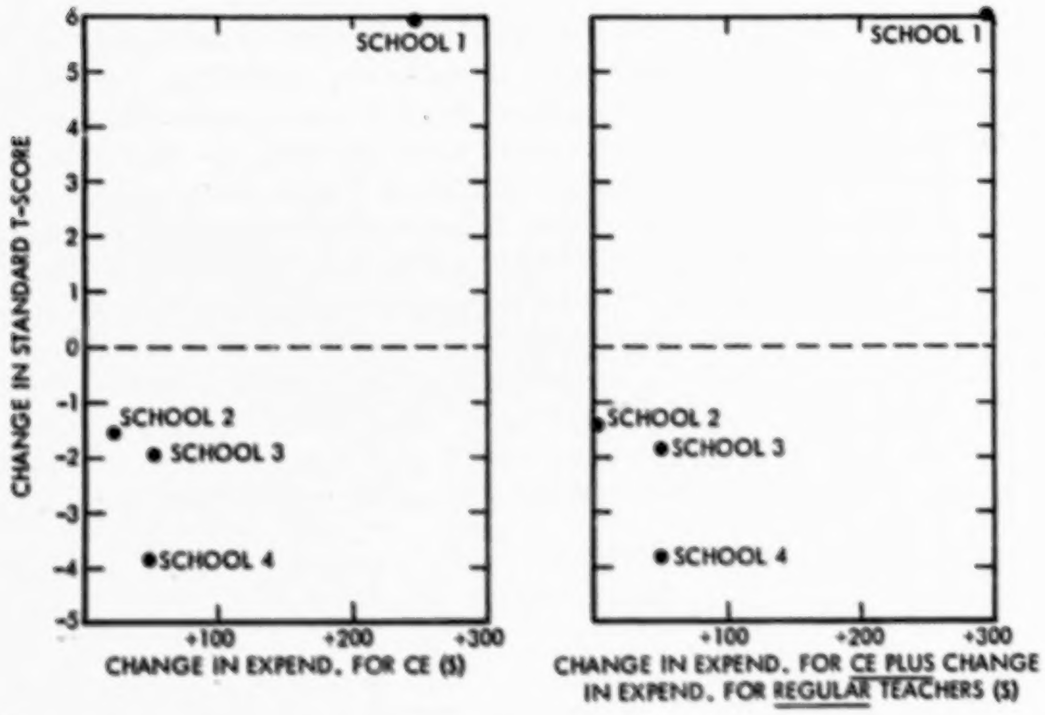

Figure 11. Change in the lowest decile versus change in per-pupil expenditures from 1965-66 to 1966-67 – District 12.

The changes for the three earlier periods shown in Table 38 indicate that the changes for the period 1966 to 1967 are within the year-to-year variation that seems to occur. It was not feasible to analyze the relationships between change in achievement and level of expenditures for the earlier periods.

In summary, we can say that the evidence in Figure 11 supports the hypothesis that enhancement of achievement is related to level of expenditure for CE. Unfortunately, the available data for District 12 are too few to prove the hypothesis.

G. CHARACTERISTICS ASSOCIATED WITH CHANGE IN ACHIEVEMENT

The analyses of variables possibly associated with change in achievement included measures of attendance, mobility, racial composition, and average preachievement level. Measures of pupil attendance, mobility and racial composition for a 3-year period were examined and are presented in Table 40 by class and by total school. The only possible relationship suggested by these data is that between attendance and reading achievement. First, the lowest achievement level is in School 4 which also has the lowest attendance rate. Second, the drop in attendance in Schools 2 and 4 between 1965 and 1966 is followed by a drop in reading achievement level the next year. However, because of the small variation in achievement and insufficient data points it is not possible to test any hypothesis concerning relationships among the variables shown.

Table 40. Percentages of attendance, mobility, and Negro pupils in sample schools – District 12.

School Year Ending / School Grade		Attendance[a]			Mobility[b]			Negro Pupils		
		65	66	67	65	66	67	65	66	67
School 1	Grade 1	93	94	93	15	12	17	3	21	34
	2	91	95	93	28	0	35	2	44	35
	3	96	95	96	21	4	15	3	47	44
	total school	95	95	95	12	8	16	2	36	37
2	1	92	93	95	17	20	22	100	100	100
	2	95	89	94	20	16	8	100	100	100
	3	98	95	95	17	21	7	100	100	100
	total school	95	94	95	13	15	10	100	100	100
3	1	94	92	93	46	27	35	19	54	45
	2	95	93	93	54	28	29	24	45	56
	3	96	95	94	21	25	33	18	57	50
	total school	95	94	94	33	26	27	18	52	51
4	1	89	89	90	24	15	20	100	100	100
	2	84	90	93	13	15	17	100	100	100
	3	93	92	94	13	15	20	100	100	100
	total school	92	90	92	16	14	23	100	100	100

Notes:

[a] ADA ÷ ADM

[b] (additions + withdrawals) ÷ enrollment

Analysis of the simple correlation coefficients suggests that there are no statistically significant relationships between changes in reading achievement level and preachievement level. None of the four measures of change ($\Delta \overline{X}$, ΔD_1, ΔQ_1, or ΔQ_3) was highly correlated with the preachievement level.

APPENDIX 5

DESCRIPTION AND ANALYSIS OF DISTRICT 8

A. SUMMARY

There were approximately 33,000 pupils in the District 8 Title I public schools in the school year 1966-67 out of a total public school enrollment of about 55,000. The total Title I funds expended amounted to $1,206,622, including approximately $100,000 directed to the nonpublic schools.* The District 8 school expenditures per pupil have risen sharply in recent years, excluding increases due to federal funds. For example, the average dollar expenditures per pupil in all public schools have increased by about 60 percent over the last 10 years and by more than 13 percent during the 2 years 1965-66 and 1966-67. In the Title I schools this increase was even greater during the same 2-year period. The average increase in Title I schools—excluding federal funds—exceeded 25 percent, and several schools had an increase of 50 percent or more.

The Title I activities implemented during 1966-67 were a continuation of the programs initiated—but not fully implemented due to a late start—the preceding year. The overall Title I program is characterized by its variety of projects, with the result that many of the activities had rather low expenditures per pupil.

Achievement data were analyzed for the two high-intensity academically oriented activities "Reading Improvement" and "Classes of Twenty." The Reading Improvement activity shows definite signs of being highly successful. The average progress of the pupils who participated in this activity was more than twice as much as would have been expected without special treatment. There was considerable variation in response among schools and among grades within schools. It was not possible, however, to attribute the variation to variation in pupil or school characteristics. There is slight, but not statistically significant, evidence that the higher grades (7 through 12) responded better than the lower grades (2 through 6) to the same intensity of reading improvement activity (approximately $177 in addition to normal expenditures per pupil during 1966-67).

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*The nonpublic Title I schools were not included in this study. Therefore, all data, tables, figures, and statements pertain only to the public schools unless explicitly stated otherwise.

Most of the analysis on the Reading Improvement activity pertained to 1966-67; however, the limited analysis of 1967-68 showed this activity as being equally successful the second year. The reading activity which was offered only every other day in 1967-68 appeared to be nearly as effective as the same type of activity offered every day in 1966-67.

The Classes of Twenty activity, on the other hand, did not produce any obvious signs of success; the average response as measured in all sub-parts of the MAT for participating pupils was at or below that which would be predicted in the absence of the special treatment. The expenditure of $315 per pupil was about twice as great as that in the Reading Improvement activity.

Changes in achievement levels over the preceding three to four years were studied, along with changes in the school population characteristics, to estimate whether there had been a trend in achievement level. The results were inconclusive and open to a certain degree of subjective interpretation. Achievement test scores did decline by an amount greater than that which might be expected by chance alone from school year 1964-65 to 1965-66, but no factors were discovered which could explain this specific change. It appears that the change was more likely due to timing and scoring of tests rather than due to a downward shift in achievement between these 2 specific years.

B. SAMPLE SCHOOLS AND THEIR CHARACTERISTICS

There were approximately 55,000 pupils enrolled in public schools and 12,000 enrolled in private schools in grades 1 through 12 in 1966-67. The approximately 33,000 pupils enrolled in public schools included in the Title I program represent over half of the total public school enrollment.

The overall pupil-to-teacher ratio in the District 8 schools has declined slowly but steadily during the last 10 years. Table 41 shows the changes in pupil-to-teacher ratio from 1965-66 to 1966-67 at all schools—both Title I and others—for which data were readily available. A comparison of the changes in pupil-to-teacher ratios at all schools with the corresponding changes in the Title I schools shows that at elementary, junior high, and senior high schools no consistent differences existed between the two groups, either in 1965-66 pupil-to-teacher ratios or in the changes in pupil-to-teacher ratios from 1965-66 to 1966-67.

Expenditures in District 8 public schools have been increasing over the past 10 years with a rather marked rise during the most recent years, as shown in Table 42. The table shows an increase in the number of pupils of about 9 percent (45,197 to 49,186) over the 10-year period, and an increase of about 60 percent ($263.57 to $422.05) in dollar expenditure per pupil. The increase in per-pupil expenditures from school year 1964-65 to 1966-67 was about 13.5 percent. These observed increases in funding for the overall school population occurred to an even greater extent in the Title I schools, as shown by the examples in Table 43.

Selection of Title I Sample Schools and Projects

Longitudinal data were used in the analysis of CE programs in District 8. The analysis was limited to two activities: Reading Improvement and Classes of Twenty. These two programs represent the majority of Title I funds for programs directly oriented toward academic skills.

Data were available and analyzed for all 16 of the public schools included in the Reading Improvement activity and three of the six schools included in the Classes of Twenty activity in 1966-67. In addition, limited analysis was done on the data for the 31 public schools included in the reading improvement activity in 1967-68. The three schools included in the analysis of Classes of Twenty activity are considered to be representative of all six public schools. The nonpublic schools were not included because data were not readily available to TEMPO.

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Table 41. Average number of pupils per teacher for selected schools—District 8.[a]

School No.	1965-66	1966-67	School No.	1965-66	1966-67
SENIOR HIGH					
14	26.5	22.0	47	22.5	23.6
15	23.6	23.6	65	25.8	26.0
16	24.9	23.5	64	15.6	20.8
JUNIOR HIGH					
10	22.8	23.6	44	19.3	19.3
11	21.1	19.9	45	22.6	22.7
12	25.3	23.3	66	20.9	20.0
13	22.4	22.2	67	17.0	22.2
41	17.2	17.3	68	22.4	21.1
43	22.7	21.4	69	22.8	22.4
ELEMENTARY					
2	22.9	27.1	34	33.5	28.7
3	32.9	32.9	35	26.9	28.6
4	29.9	28.2	36	26.7	28.3
5	27.4	25.2	37	22.2	26.7
6	29.3	27.8	38	27.3	27.4
7	26.2	29.1	39	27.7	27.0
8	28.1	26.7	48	30.3	30.2
9	30.4	28.5	49	20.1	29.9
17	30.3	32.2	50	29.2	31.6
18	27.3	28.3	51	32.3	31.5
19	28.5	29.0	52	28.7	32.6
20	27.8	28.8	53	30.0	29.6
21	30.2	33.0	54	29.5	29.7
22	27.2	28.1	55	28.0	28.8
23	29.0	31.3	56	28.3	30.9
24	26.6	27.0	57	27.9	25.8
25	25.6	24.0	58	27.8	28.9
26	28.8	26.3	59	27.4	27.4
29	29.0	30.5	60	30.9	30.9
30	30.3	31.1	61	29.0	33.2
31	30.3	27.6	62	27.7	29.5
32	29.1	28.2	63	30.0	31.9
33	30.9	29.6			

Note:

[a] All schools for which data are available for both years are recorded.

Table 42. Expenditures from general fund and number of pupils – all schools in District 8.[a]

Fiscal Year	Total Expenditure ($)	Pupil ADM	Expenditure Per Pupil ($)
1957-58	11,912,681	45,197	263.57
1958-59	12,018,942	45,694	263.03
1959-60	12,506,216	45,770	273.24
1960-61	13,856,036	46,495	298.01
1961-62	14,481,381	47,400	305.51
1962-63	14,922,707	48,407	308.27
1963-64	14,912,527	49,268	302.68
1964-65	15,473,736	49,347	313.57
1965-66	17,207,800	49,199	349.76
1966-67	20,759,036	49,186	422.05

Note:

[a] These data do not include special voted Building Fund Revenue of approximately $2.8 million per year or $3.5 million in grants from federal funds.

Data obtained from Reference 13.

The pupil population in the Title I schools is characterized by the following facts:

1. **Approximately 33,000 pupils attended 45 Title I public schools in 1966-67.**
2. **Achievement of about 25 percent to 30 percent of the pupils in the junior and senior high schools is 2 years or more below grade level; proportionately smaller amounts of retardation exist in the lower grades (e. g., achievement of about 25 to 30 percent of grade 4 pupils is 1 year below grade level).**
3. **In school year 1965-66, 1,719 pupils (4.9 percent of total enrollment) were retained in the same grade.**

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Table 43. Changes in General Fund expenditures per pupil from school year 1964-65 to 1966-67 at 14 Title I schools in District 8.[a]

School No.	Total Expenditure ($)	ADM	Expenditure Per Pupil ($)	Increase in Expenditure Per Pupil (%)
14				
1964-65	569,486	1,623	350.88	
1966-67	776,184	1,565	495.96	41.35
16				
1964-65	447,173	1,430	312.71	
1966-67	598,513	1,404	426.29	36.32
15				
1964-65	570,775	1,604	355.84	
1966-67	725,677	1,588	456.97	28.42
12				
1964-65	338,485	1,308	258.78	
1966-67	497,098	1,496	332.28	28.40
11				
1964-65	361,278	998	361.80	
1966-67	424,954	905	469.56	29.70
10				
1964-65	364,067	1,109	328.28	
1966-67	462,984	1,085	426.71	29.98
13				
1964-65	270,110	732	369.00	
1966-67	324,816	745	435.99	18.15
3				
1964-65	121,290	614	197.54	
1966-67	184,203	769	239.54	21.26
4				
1964-65	164,369	693	237.18	
1966-67	196,332	509	385.72	62.63
6				
1964-65	195,774	774	252.18	
1966-67	231,592	726	319.00	26.12

Note:
[a] Does not include federal funds.

Table 43 (continued).[a]

School No.	Total Expenditure ($)	ADM	Expenditure Per Pupil ($)	Increase in Expenditure Per Pupil (%)
31				
1964-65	80,447	363	221.62	
1966-67	112,825	337	334.79	51.06
8				
1964-65	169,636	722	234.95	
1966-67	186,936	571	327.38	39.34
2				
1964-65	186,073	553	336.48	
1966-67	225,756	593	380.70	13.14
9				
1964-65	215,853	902	239.30	
1966-67	312,329	872	358.17	49.67

Note:
[a]Does not include federal funds.

4. There were 1,747 dropouts from the junior and senior high schools in school year 1965-66. One senior high school had a dropout rate of 23 percent (466 dropouts from an average membership of 2,015) during 1965-66. Three other senior high schools had dropout rates of 18 percent, 13 percent, and 11 percent.
5. Attendance at all Title I schools was 92 percent or less, and attendance at all non-Title I schools was 95 percent or better in 1965-66.
6. There are an estimated 3,400 physically and mentally handicapped students in the Title I schools (approximately 10 percent of the total membership in these schools).

7. The Title I schools had an average index of mobility* of 38.6 percent in school year 1964-65. One school had a value greater than 100 percent; seven schools had values greater than 50 percent.

8. The average Title I school was 49 percent Negro.

Achievement Tests

Pupils enrolled in the Reading Improvement activity were tested on the Durrell-Sullivan test at the beginning of the activity and tested on an alternate form of the test at the completion of the activity within the same school year. In most cases pupils were enrolled in the activity for 30 weeks, so the tests were at the beginning and end of the school year.

There was no special testing of pupils enrolled in the Classes of Twenty activity, so test results from the regular district-wide testing were used. These consisted of the subparts of the Metropolitan Achievement Tests given in April of each school year. The test results for preexposure to this CE activity were the scores in the previous grade in the year prior to enrollment in the activity. The test results for postexposure were the scores in April of the year the pupil was enrolled in the activity.

C. TYPES OF CE ACTIVITIES

The 1966-67 Title I program was a continuation of the program initiated the preceding year but which was not fully implemented because of its late start in the school year.* Table 44 contains a short description of each activity, its cost, and the target group to which the activity was oriented. The following excerpts from the District 13 application for Title I funds for the year 1966-67 (Reference 1) present the rationale for the activities which were selected.

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*Unlike the other case studies described in this report, the index of mobility was computed at each school as the ratio of (the number of students entering the school after the formal opening of school plus the number of students leaving the school during the year) to (the number of students enrolled at the beginning of the school year).

> "In considering the large number of pupils to be served by the project and the various needs of these children, the staff decided to provide educational opportunities of sufficient variety to appeal to many interests but to include specific limits which would make it possible to administer and evaluate the program. Accordingly, the [Title I] project includes eleven separate activities dealing with virtually every aspect of the curriculum in varying degree... ."
>
> "A study of achievement test results in several subject areas on file in the Research Office of the... Board of Education indicates that in the project areas approximately 25 percent of the children in grade 6 are achieving 2 years or more below grade level in one or more of the subjects tested and a proportionate number of years below grade level in grades 1 through 5. The test results of pupils in grades 7, 8, and 11 indicate that approximately 30 percent of the secondary school pupils in the project areas are two or more years below grade level in subjects tested. Accordingly, in this school district's project proposal 'educationally

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*The expenditures in the preceding year (the first year of Title I) were primarily for supplies and equipment. The opinion of school officials interviewed by TEMPO was that those academic-oriented activities that were initiated in the spring of 1966 probably did not operate long enough to have significant impact. The total Title I expenditure of $1,419,554 in 1965-66 was allocated as follows:

Salaries - $364,582
Equipment, supplies, and fieldtrips - $863,217
Health, food, and transportation - $46,047
Mobile units - $106,687
Fixed charges - $39,020.

deprived' refers to 25 percent of all elementary children attending both public and parochial schools in the project areas and 30 percent of all public secondary pupils plus approximately 100 pupils attending two parochial secondary schools in the project area.

"Records in the Pupil Personnel Division of the Board of Education show the following retentions in the same grade in the project area schools for the school year 1965-66: grades 1 through 6, 906; grades 7 through 9, 278; and grades 10 through 12, 535. The total of 1,719 retentions are 4.9 percent of the total membership.

"The programs described in Activities I, II, V, VI and IX are designed specifically to enhance the opportunities for greater educational achievement of children in the project areas. It is believed that greater motivation for achievement will be provided and that school failures will be reduced.

"In the project area public schools almost 1,500 children in grades 7 through 12 can be expected to drop out of school during the year. More than 1,400 suspensions, grades 1 through 12, on account of disciplinary problems can be expected. More than 11,000 pupils, grades 1 through 12, attend schools where the attendance rate is below 92 percent. Subjective judgment of staff is that 20 percent of the pupils, grades 1 through 12, have a negative attitude toward school and education.

"Activities III and IV should provide incentives sufficient to make an education more attractive to the children identified in the preceding paragraph.

"Since 88.8 percent of the children from low-income families in the district reside in the project areas, it can be assumed that a large number of children in the project areas need the special attention of the health service program provided in Activity VII.

> "Data in the Pupil Personnel Division of the Public Schools indicate that there are more than 3,400 (10.3 percent) physically and mentally handicapped children, grades 1 through 12, in the project areas who need the special opportunities described in Activity VIII.
>
> "The supportive services for teachers provided in Activity X are necessary to provide staff competency to render the special services which educationally deprived children need. Because the needs of these children are different from those of children in other areas of the city, the teaching methods must be different and the teachers must constantly study new and different approaches in the educational process.
>
> "The counseling and special summer school activities described in Activity XI lend special support to the total program for pupils described in other Activities... ."

The CE activities are divided into three groups: those that affected most or all the pupils in Title I schools and resulted in $2 to $20 increases in per-pupil expenditure; those that were oriented toward pupils with very special problems and who comprise less than 1 percent of the pupil population; and those who are oriented toward a significant portion of the total population of pupils in Title I schools. The latter group of projects was the group studied in this research effort. The first group cannot be expected to have produced significant improvement in pupils because the intensity of effort was low. The second group needed and received considerable extra resources, but it is questionable if the special problems can be attributed to economic deprivation, which is the focal point of the Title I program.

As shown in Table 44, much of the money received from Title I in 1966-67 was spent for teachers. They were either regular teachers as in the "Classes of Twenty" activity, resource teachers as in the case of the "Physical Education" activity, or teaching assistants as in the case of the "Language Development" activity.

3

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Table 44. Activities in District 8, 1966-67.

Activity	Short Title & Description	Expenditure ($)	Target Group
I.A.	Language Development of Elementary Students. To provide teacher assistants working with regular classroom teachers to help students who are deficient in communicative skills. Requires 31 TA's and three resource teachers. One TA in each of 31 schools to work with grades 2 through 6.	94,707	Estimated 14,766 pupils, grades 2 through 6, 31 schools.
I.B.	Clarification of Concepts in Social Studies, Science, and Math. For TA's to work with regular classroom teachers in providing concrete experiences to aid in understanding academic concepts more readily. Requires 31 TA's and two resource teachers. One TA in each of 31 schools to work with grades 2 through 6. (Same 31 TA's as in activity I.A.)	54,061	Estimated 14,766 pupils, grades 2 through 6, 31 schools.
I.C.	Help for Children With Learning Disabilities Due Primarily to Perceptual-Motor Problems. Requires one TA in each of 31 schools to work with first graders only. (These 31 TA's are in addition to the 31 engaged in activities I.A. and I.B.)	66,960	2,824 first graders in 31 schools.

Table 44. (continued)

Activity	Short Title & Description	Expenditure ($)	Target Group
II.A.	Improvement of Basic English Communication Skills. For promotion of recreational reading. Books, magazines, and audio-visual material. One supervisor.	17,105	Estimated 15,492 pupils, grades 7 through 12, in nine junior and four senior high schools.
II.B.	Enrichment of Science & Math Experiences. For scientific displays and equipment and in-service teacher training. One supervisor.	31,731	Estimated 15,492 pupils, grades 7 through 12, in nine junior and four senior high schools.
II.C.	Strengthening Social Studies Performance through Increased Instructional Resources. Provision of instructional materials and equipment to assist learning.	14,636	Estimated 15,492 pupils, grades 7 through 12, in nine junior and four senior high schools.
III.A.	Home Economics. For materials and equipment.	3,800	Estimated 3,032 pupils, grades 7 through 12, in nine junior and four senior high schools.
III.B.	Industrial Arts. For equipment and supplies.	1,652	Estimated 4,560 pupils in nine junior and four senior high schools.
III.C.	To Develop Manners, Habits, and Personal Appearance Necessary for Employment for Untidy	11,447	Estimated 1,000 pupils in nine junior and four senior high schools.

Table 44. (continued)

Activity	Short Title & Description	Expenditure ($)	Target Group
III.C. (cont'd)	and poorly mannered Children. Includes training on adding machines, ditto, and transcribing machines.		
IV.A.	Art. Requires two resource Teachers and one resource artist. Art demonstrations to teach appreciation.	22,744	Estimated 17,590 elementary pupils, grades 1 through 6.
IV.B.	Music Appreciation. Requires two resource teachers and two itinerant band teachers.	27,288	Estimated 17,590 elementary pupils, grades 1 through 6.
V.	Reading Improvement. Requires 22 R.I. teachers and 22 TA's at 20 different schools, public and nonpublic. (See Section F for analysis of this activity.)	140,833	About 793 pupils, grades 2 through 12, in 16 different public and four nonpublic schools.
VI.	Library Program. Requires 16 clerks, 10 librarians, and one supervisor, at 25 schools.	125,861	About 10,000 pupils, grades 1 through 6, in 16 elementary schools. About 9,000 pupils, grades 7 through 9, in nine junior high schools.
VII.A.	Physical Education. Requires one resource teacher.	6,724	About 17,590 elementary pupils, grades 1 through 6.

Table 44. (continued)

Activity	Short Title & Description	Expenditure ($)	Target Group
VII.B.	Health Services. Requires four TA's trained to give eye and ear tests.	9,440	All elementary pupils, grades 1 through 6; 15,115 screened and 799 referred to doctors. No follow up.
VIII.A.	Educational Opportunity for Trainable Mentally Retarded Children. City took over previously privately operated school.	55,597	84 children.
VIII.B.	Improving Educational Opportunities for Educatable Mentally Retarded. Primarily vocational training; requires one job coordinator, one speech therapist, one resource teacher, one supervisor, and one clerk.	34,147	About 101 elementary, 382 junior high, 189 senior high pupils, grades 1 through 12, in all schools.
VIII.C.	Acoustically Handicapped. Requires purchase of an auditory training unit.	694	About 10 children.
VIII.D.	Special Classes for Perceptually Handicapped.	21,610	Two classes of 10 pupils each, grades 1 through 6, in all schools.

Table 44. (continued)

Activity	Short Title & Description	Expenditure ($)	Target Group
IX.	"Classes of Twenty." For pupils 2 or more years retarded in achievement but with potential to do better. (See Section F for analysis of this activity.)	132,608	Twenty-three classes of no more than 20 members each, grades 7 through 9, in 4 junior highs and 2 senior highs; about 420 pupils.
X.A.	Exhibit Library of Instructional Materials. For teachers of educationally deprived children.	4,284	All pupils (33,000) in Title I schools.
X.B.	Developing Curriculum Materials for Educationally Deprived Students. Covers development and evaluation of curriculum guides.	31,841	All pupils (33,000) in Title I schools.
X.C.	In-service Teacher Education for Teachers of Educationally Deprived Children.	14,504	All pupils (33,000) in Title I schools.
X.D.	Evaluation and Research Relating to the Title I Program.	26,987	Not applicable.
XI.A.	Counseling. For four counselors and two visiting teachers.	55,900	Four counselors for 3,952 pupils in 3 junior highs and 1 senior high. Two visiting teachers for 9 junior and 4 senior high schools to handle individual cases as required.

Table 44. (continued)

Activity	Short Title & Description	Expenditure ($)	Target Group
XI.B.	Summer School. For elementary class sizes of 20; secondary class sizes of 22. Half days for 6 to 7 weeks.	83,911	873 elementary (grades 1-6) pupils and 484 secondary (grades 7-12) pupils, 1,357 total.
XI.C.	Cerebral Palsy Summer School. Covers half day classes for 6 weeks.	10,836	About 114 pupils.
XI.D.	School Summer Program. Fifteen days experimental program camping.	2,294	Thirty-five pupils, grades 4 through 5.
	Total	1,110,000[a]	Approximately 33,000 pupils.

Note:
[a] Rounded to the nearest $10,000; does not include approximately $100,000 expended by the nonpublic schools.

D. ALLOCATION OF FUNDS FOR CE

Table 45 lists the total expenditures, number of pupils affected, and expenditure per participating pupil for each activity. A wide variation in all three measures is apparent: a high of $140,833 and a low of $694 in total expenditures per activity; a high of 33,000 participating pupils and a low of 10 pupils; and a high of $1,080.50 per pupil and a low of $0.12 per pupil. Figure 12 shows a cumulative graph of the percentage of pupils who received more than a specified amount of CE expenditures and percentage who received more than a specified percent of the Title I dollars. Figure 13 shows the number of activities for which the per-pupil expenditure was less than a specified value.

Table 46 shows the distribution of activities by expenditures per pupil and number of pupils. The "high-intensity" programs appearing in the first row of the table ("more than $50 per pupil")

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Table 45. Summary of expenditures and number of pupils affected by activity – District 8.

Activity[a]	Expenditures ($)	No. of Pupils	Expenditures Per Pupil ($)
I.A	94,707	14,766[b]	6.41
I.B	54,061	14,766[b]	3.66
I.C	66,960	2,824	23.71
II.A	17,105	15,492[c]	1.10
II.B	31,731	15,492[c]	2.04
II.C	14,636	15,492[c]	.94
III.A	3,800	3,032	1.25
III.B	1,652	4,560	.36
III.C	11,447	1,000	11.44
IV.A	22,744	17,590[d]	1.29
IV.B	27,288	17,590[d]	1.55
V.	140,833	793	177.59
VI.	125,861	19,000	6.62
VII.A	6,724	17,590[d]	.38
VII.B	9,440	17,590[d]	.53
VIII.A	55,597	84	661.86
VIII.B	34,147	1,372	24.88
VIII.C	694	10	69.40
VIII.D	21,610	20	1,080.50
IX.	132,608	420	315.73
X.A	4,284	33,000[e]	.12
X.B	31,841	33,000[e]	.96
X.C	14,504	33,000[e]	.43
X.D	26,987	33,000[e]	.81

Table 45. (continued)

Activity[a]	Expenditures ($)	No. of Pupils	Expenditures Per Pupil ($)
XI.A-1[i]	38,000[f]	3,952	9.61
XI.A-2[i]	17,900[g]	15,492[c]	1.15
XI.B	83,911	1,357	61.83
XI.C	10,836	114	95.05
XI.D	2,294	35	65.54
Total	1,100,000[h]		
Mean	37,000	11,463	90.58

Notes:

[a] See Table 44 for description of each activity.

[b] All pupils in grades 2 through 6.

[c] All pupils in grades 7 through 12.

[d] All pupils in grades 1 through 6.

[e] All pupils in Title I schools, grades 1 through 12.

[f] Counselor's salaries.

[g] Visiting teacher's salaries.

[h] Rounded to the nearest $10,000; the total expenditure shown does not include the approximately $100,000 expended by the non-public schools.

[i] Subdivided to distinguish between counselor and visiting teacher services, respectively.

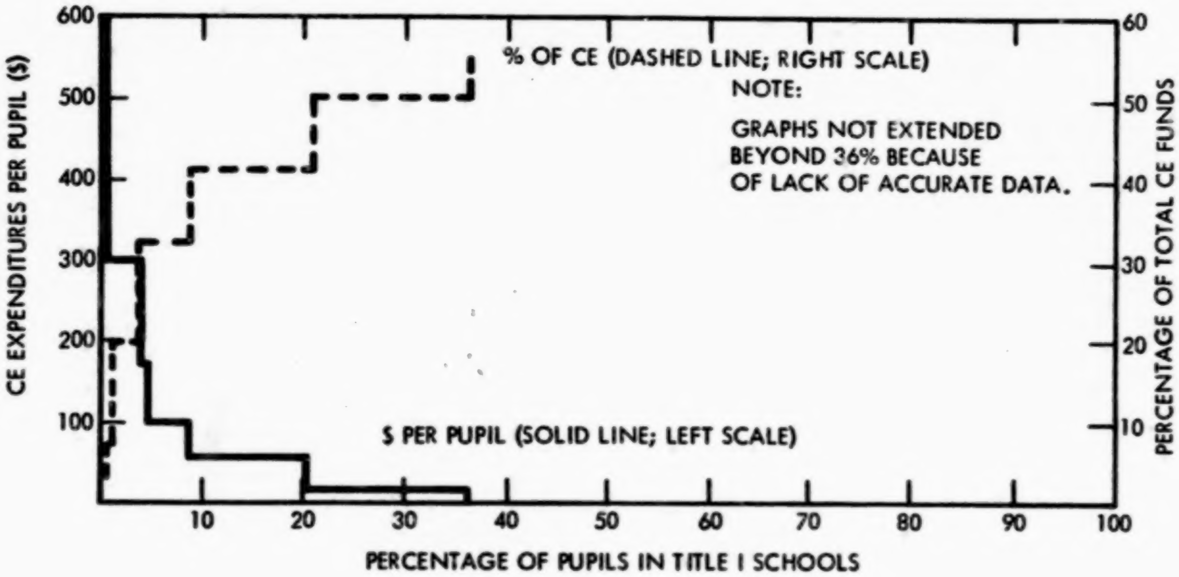

Figure 12. Cumulative distribution of CE expenditures per pupil and percentage of total funds—District 8.

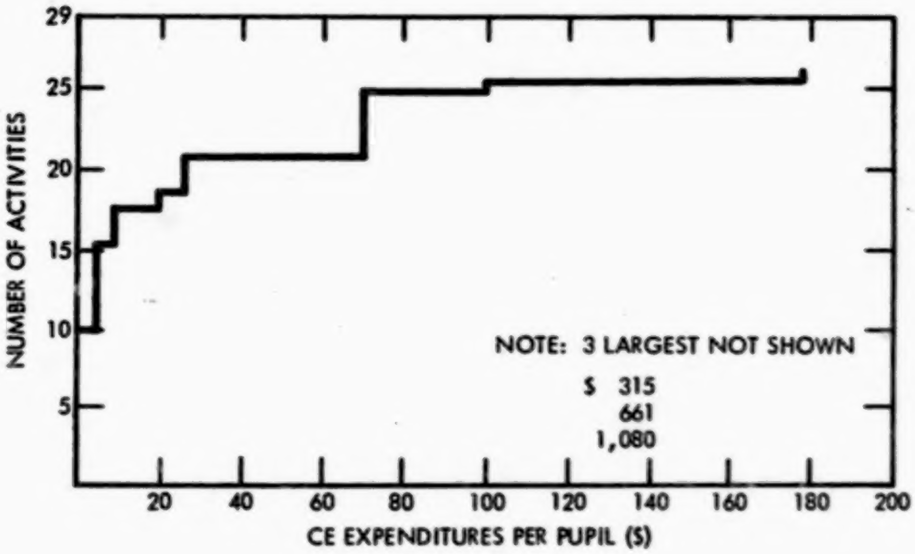

Figure 13. Cumulative distribution of number of activities — District 8.

Table 46. Distribution of activities by number of pupils and expenditures per pupil — District 8.

Exp. Per Pupil ($) / No. of Pupils	High (over 5,000)	Medium (1-5,000)	Low (under 1,000[a])
High more than 50		XI.B	V IX XI.C XI.D VIII.A VIII.C VIII.D
Medium more than 2 but less than 50	I.A I.B	I.C III.C VI VIII.B XI.A-1	
Low less than 2	II.A II.B II.C IV.A IV.B VII.A VII.B X.A X.B X.C X.D XI.A-2	III.A III.B	

Note:

[a] These 7 activities covered 1,476 pupils (4.4 percent) of total Title I Schools and accounted for $364,472 (30.2 percent) of the total Title I expenditures of $1,206,622.

accounted for over 37 percent of the total Title I expenditure. In contrast, the "low-intensity" programs appearing in the last line of the table accounted for about 19 percent of the total expenditure.

The activities listed in Table 47 are those which were oriented toward all of the pupils in the Title I schools at various grade levels. These activities were of rather low intensity in terms of dollars per pupil, but yet accounted for nearly 35 percent of the Title I dollars spent.

The remaining activities fall into three categories:

1. Those which affected all students in a grade, but not at all the Title I schools (VI, Library Program; XI. A-1, Counselors).
2. Those directed to relatively small groups within a grade (III. A, Home Economics; III. B, Industrial Arts; III. C, Business Education; V, Reading Improvement; VIII. A, Trainable Mentally Retarded; VIII. B, Educatable Mentally Retarded; VIII. C, Acoustically Handicapped; VIII. D, Perceptually Handicapped; IX, Classes of Twenty; XI. B, Regular Summer School; XI. C, Cerebral Palsy Summer School; XI. D, Special Summer School).
3. Those of a general nature which make allocation at the per-pupil level difficulty to interpret (X. D, Evaluation and Research).

Preachievement and postachievement test results were readily available only for activities V and IX. Therefore, analysis is restricted to these two activities. Fortunately, these were both high-intensity activities and the Reading Improvement Program (Activity V) shows evidence of producing definite progress.

The Reading Program was conducted in 1967-68 as well as the year of main interest, 1966-67. Certain changes having important cost implications were made in the second year and it appears from analysis of the records of about 60 percent of the participating students that response to the treatment may be insensitive to these changes. The activity is summarized in Table 48 and considered in greater detail subsequently.

Table 47. Expenditures per pupil in 1966-67 for activities which affected all pupils in Title I schools at different grade levels – District 8.

Grade	Expenditures Per Pupil by Activity ($)													
	I.A	I.B	I.C	II.A	II.B	II.C	IV.A	IV.B	VII.A	VII.B	X.A	X.B	X.C	Totals[a]
1			23.71				1.29	1.55	.38	.53	.12	.96	.43	28.97
2	6.41	3.66					1.29	1.55	.38	.53	.12	.96	.43	15.33
3	6.41	3.66					1.29	1.55	.38	.53	.12	.96	.43	15.33
4	6.41	3.66					1.29	1.55	.38	.53	.12	.96	.43	15.33
5	6.41	3.66					1.29	1.55	.38	.53	.12	.96	.43	15.33
6	6.41	3.66					1.29	1.55	.38	.53	.12	.96	.43	15.33
7				1.10	2.04	.94					.12	.96	.43	6.74
8				1.10	2.04	.94					.12	.96	.43	5.59
9				1.10	2.04	.94					.12	.96	.43	5.59
10				1.10	2.04	.94					.12	.96	.43	5.59
11				1.10	2.04	.94					.12	.96	.43	5.59
12				1.10	2.04	.94					.12	.96	.43	5.59

Note:

[a] These activities accounted for $413,925 or 34.3 percent of the total $1,206,622 Title I expenditure.

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Table 48. Summary of reading improvement activity — District 8.

	1966-67	1967-68
Total Expenditure	$140,833	$282,916
Total No. Pupils	793	1,700 (est)
Average Dollars Per Pupil	177.59	
grades 7-12		$ 148 (est)
grades 2-6		$ 74 (est)
Numbers of Schools Served	20	49
Hours of Exposure Per Week	4.5	
grades 7-12		4.5
grades 2-6		2.25
Teaching Assistants Employed	Yes	No

The Classes of Twenty Activity (Activity IX) was conducted in both years, but data on achievement were available for only 1966-67. It is also discussed in detail subsequently; its major characteristics are summarized in Table 49.

Table 49. Summary of Classes of Twenty activity — District 8.

	1966-67	1967-68
Total Expenditure	$132,608	Not Analyzed
Total Number of Pupils	420	
Average Expended Per Pupil	$315.73	
Number of Schools Served	6	
Hours Per Week	Varied by school: 4 hours to full time	

E. ANALYSIS OF TREND

The question of "trend" is of lesser interest in TEMPO's analysis of CE in District 8 than in other districts, since the District 8 analysis is based upon longitudinal data. Longitudinal data are two or more measurements on a fixed set of individuals at different points in time: before CE exposure and after exposure. It has been assumed that trend effects on the performance of the same individual on tests one year or less apart would be negligible relative to the effects of intensive CE activities such as the Reading Improvement and Classes of Twenty programs.

Although the analysis reported in Section F does not contain any correction for trend, the question of trend is an intrinsically interesting one and, therefore, was considered. Briefly, the available data do not provide a clear answer to the question on trend. It appears that the trend, if any, consisted of a slight drop in achievement from school year 1964-65 to 1965-66.

The drop from 1964-65 to 1965-66 was about 0.1 grade equivalent when computed over all grades and schools in the city; the same value 0.1 was also obtained by averaging over all grades in only the Title I schools. There were 23 positive changes versus 41 negative changes, or 64 percent negative changes in the Title I schools from 1964-65 to 1965-66. If these changes represent only random fluctuation the probability of 64 percent or larger percent negative changes is 0.01. This is evidence that the number of negative changes which occurred was due to factors other than chance alone.

However, the drop in achievement from 1964-65 to 1965-66 did not appear to be related to any other factors for which data were available and which might be expected either to accompany or produce a trend. For example, it was considered that the drop might be related to changes in racial composition. Table 50, however, shows no apparent connection between changes in racial composition and changes in achievement.

Other factors which were examined for their possible effect on the drop between 1965-66 and 1966-67 were (1) changes in attendance, (2) changes in dropout rates, and (3) changes in pupil-to-teacher ratio. Tables 51, 52, and 53 exhibit the changes, respectively, in attendance, dropout rates, and pupil-to-teacher ratios

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Table 50. Change in achievement level[a] and racial composition Title I schools, 1964-66 — District 8.

School No.	Grade	% Negro 1964-65[c]	Change in % Negro 1964-65 to 1965-66[c]	Specific Grade	Class Median Score 1964-65	Change in Median 1964-65 to 1965-66
2		47	4			
	6			6	5.7	-0.6
	4			4	3.7	0
3		58	4			
	6			6	5.5	0
	4			4	3.5	0.2
4		8	-1			
	6			6	6.6	-0.9
	4			4	4.2	-0.5
5		8	0			
	6			6	5.5	0.2
	4			4	4.3	-0.9
6		98	1			
	6			6	4.9	0.2
	4			4	3.9	-0.6
7		92	3			
	6			6	5.3	0
	4			4	3.7	-0.1
8		99	0			
	6			6	5.5	-0.2
	4			4	3.7	-0.3
9		97	2			
	6			6	4.9	0.4
	4			4	3.4	0
10		99	0			
	8			8	6.0	-0.3
	7			7	6.0	-1.1
11		45	2			
	8			8	8.5	-2.2
	7			7	5.5	-0.2
12		47	8			
	8			8	7.3	1.0
	7			7	5.7	0.3

Table 50. (continued)

School No.	Grade	% Negro 1964-65[c]	Change in % Negro 1964-65 to 1965-66[c]	Specific Grade	Class Median Score 1964-65	Change in Median 1964-65 to 1965-66
13		20	3			
	8			8	6.3	0.3
	7			7	5.7	-0.1
14		10	6			
	11			11	33[b]	-8[b]
15		100	0			
	11			11	21[b]	0[b]
16		34	13			
	11			11	40[b]	0[b]
17		89	4			
	6			6	5.5	0.2
	4			4	3.6	-0.1
18		96	1			
	6			6	5.1	0
	4			4	3.4	-0.1
19		99	1			
	6			6	4.4	0.5
	4			4	5.3	-1.0
20		7	6			
	6			6	5.9	0
	4			4	3.4	0.1
21		41	-2			
	6			6	5.9	-0.2
	4			4	3.9	-0.1
22		9	-2			
	6			6	6.3	-0.6
	4			4	3.7	0
23		2	0			
	6			6	5.7	0.2
	4			4	4.0	0.3
24		20	1			
	6			6	5.9	0.7
	4			4	4.0	0.4

Table 50. (continued)

School No.	Grade	% Negro 1964-65^c	Change in % Negro 1964-65 to 1965-66^c	Specific Grade	Class Median Score 1964-65	Change in Median 1964-65 to 1965-66
25		45	3			
	6			6	5.3	-0.4
	4			4	3.4	0.3
26		38	18			
	4			4	3.7	-0.1
29		27	7			
	6			6	5.5	-0.2
	4			4	3.8	0.4
30		99.7	-0.4			
	6			6	5.1	0.2
	4			4	3.4	0
31		1	0			
	6			6	5.9	0.2
	4			4	3.3	0
32		7	6			
	6			6	5.9	-0.6
	4			4	3.7	-0.3
33		1	1			
	6			6	6.1	-0.4
	4			4	4.2	-0.3
34		60	5			
	6			6	5.3	0.4
	4			4	3.8	-0.1
35		100	0			
	6			6	5.5	-0.2
	4			4	3.4	-0.2
36		91	-2			
	6			6	4.9	0.4
	4			4	4.4	-0.6
37		11	2			
	6			6	5.7	-0.2
	4			4	4.5	-0.8

Table 50. (continued)

School No.	Grade	% Negro 1964-65[c]	Change in % Negro 1964-65 to 1965-66[c]	Specific Grade	Class Median Score 1964-65	Change in Median 1964-65 to 1965-66
38		99	0			
	6			6	5.1	0.2
	4			4	3.5	0.1
39		99	0			
	6			6	4.9	-0.2
	4			4	3.8	0
42		21	0			
	8			8	7.1	-0.8
	7			7	5.7	0.3
43		57	10			
	8			8	6.8	-0.2
	7			7	5.5	0
44		100	0			
	8			8	5.3	0
	7			7	4.7	0.2
45		15	3			
	8			8	7.1	-0.8
	7			7	5.7	0
47		37	9			
	11			11	38[b]	0[b]
63		31	10			
	6			6	5.5	0
	4			4	4.4	-0.2
70		9	3			
	6			6	5.3	-0.6
	4			4	4.0	-0.5
Mean for 43 Schools		49				

Notes:

[a] Shown only for those schools and grades for which test results were available.

[b] Denotes percentile rank; otherwise figures are in grade equivalents.

[c] Racial information not available at grade level.

which occurred from 1964-65 to 1966-67. Table 51 shows no appreciable change in attendance from 1964-65 to 1965-66. Table 52 contains dropout figures for the Title I senior high schools and, in all four cases, the dropout rate decreased from 1964-65 to 1965-66. Comparable figures for the junior high schools were not readily available on the basis of percent of membership. The total number of dropouts at these schools was, however, available and the results show a decrease from 286 dropouts in 1964-65 to 272 dropouts in 1965-66. Table 53, containing the changes in pupil-to-teacher ratios at the junior and senior high schools, shows an improved ratio from 1964-65 to 1965-66 in 11 out of 12 cases. The change in pupil-to-teacher ratio at the elementary schools, obtained only on an overall basis for both Title I and non-Title I, shows a slight improvement of 30.0 to 29.2 for the same time period.

School administrators in District 8 were unable to offer any suggestions on changes in other variables that could explain the drop in achievement from 1964-65 to 1965-66.

One might next look for the existence of trends within specific schools or within certain grade levels across the Title I set of schools. These are more difficult considerations because of the general unavailability of test results at any particular grades and schools over a number of years. Data for grades 4 and 5 in eight Title I schools over the 4-year period 1963-64 to 1966-67 are shown in Figure 14. The class medians averaged over the eight schools for each year are shown as well; these represent over 5,000 students for each grade for each year.

The grade 4 achievement level dropped about 0.25 grade equivalents from 1964-65 to 1965-66. However, the drop in grade 5 from 1963-64 to 1965-66 was much less, only 0.08. One could proceed to test the statistical significance of the 0.25 drop in the fourth grades, but even if it were statistically significant interpretation would be difficult since the fifth grades at the same schools did not show a comparable drop in achievement. It is difficult to interpret a "trend" which affects the different grades in a school unequally. Hence, one is inclined to attribute the fluctuation to something other than a systematic trend in the socio-economic environment of the school population.

Table 51. Percentage of attendance in Title I public schools — District 8.

School No.	% Attendance 1964-1965 No. Title I Activities	% Attendance 1965-1966	% Attendance 1966-1967 First Full Year Title I	Change from 64-65 to 66-67
1	92.8	93.0	92.9	+0.1
2	92.6	92.9	92.9	+0.3
3	94.2	94.8	94.9	+0.7
4	93.3	93.1	93.6	+0.3
5	91.7	91.7	93.3	+1.6
6	93.3	94.1	93.9	+0.6
7	94.1	94.2	94.1	0.0
8	92.1	92.4	92.7	+0.6
9	92.5	91.9	92.7	+0.2
10	91.9	92.0	92.0	+0.1
11	89.4	90.0	90.8	+1.4
12	93.7	93.7	94.2	+0.5
13	90.1	90.0	90.6	+0.5
14	90.6	91.9	93.1	+2.5
15	86.9	86.2	85.9	-1.0
16	90.4	91.7	91.2	+0.8
17	94.7	95.1	94.5	-0.2
18	92.9	93.3	93.2	+0.3
19	94.4	94.5	94.8	+0.4
20	92.9	93.0	92.3	-0.6
21	94.3	94.9	95.6	+1.3
22	93.6	93.9	92.4	-1.2
23	94.9	94.4	94.4	-0.5

Table 51. (continued)

School No.	% Attendance 1964-1965 No. Title I Activities	% Attendance 1965-1966	% Attendance 1966-1967 First Full Year Title I	Change from 64-65 to 66-67
24	94.1	94.9	94.9	+0.8
25	92.8	93.6	93.3	+0.5
26	93.0	92.3	92.2	-0.8
27	91.5	92.4	93.2	+1.7
28	88.9	89.8	90.6	+1.7
29	92.8	92.1	92.8	0.0
30	92.0	92.7	92.1	+0.1
31	92.7	92.7	94.2	+1.5
32	92.8	93.1	92.1	-0.7
33	93.0	93.6	94.2	+1.2
34	94.6	95.5	95.4	+0.8
35	92.6	91.9	93.3	+0.7
36	94.8	93.8	95.8	+1.0
37	91.7	91.9	92.0	+0.3
38	94.1	94.9	95.3	+1.2
39	92.1	92.3	91.8	-0.3
40	91.2	91.7	91.4	+0.2
44	90.3	91.4	89.5	-0.8
45	90.5	91.5	93.8	+3.3
47	90.9	93.2	92.5	+1.6
70	94.4	94.8	n.a.	n.a.

Table 52. Comparison of senior high school dropouts: 1964-65, 1965-66, 1966-67.

School No.	Dropouts			September Membership			Dropouts as Percentage of Membership		
	64-65	65-66	66-67	64-65	65-66	66-67	64-65	65-66	66-67
Title I									
14	433	466	376	1,811	2,015	1,716	23.9	23.1	21.9
15	327	299	377	1,717	1,700	1,724	19.0	17.6	21.8
16	205	194	226	1,518	1,469	1,526	13.5	13.2	14.8
47	208	141	194	1,475	1,330	1,391	14.1	10.6	13.9
Non-Title I									
65	59	68	78	1,364	1,341	1,354	4.3	5.1	5.7
64	177	186	193	2,184	1,917	1,703	8.1	9.7	11.3

Source: Division of Research, Records, and Information.

This same pattern is observed by comparing the changes in grades 7 and 8 at the Title I schools from 1964-65 to 1965-66.

A 0.26 drop occurred in the eighth grades while the seventh grades in the same set of schools dropped only 0.07 during the same year. Data which were also available for 23 grade 6 units show a drop of 0.04. These data are summarized in Table 54.

The Phase I study report contained plots of the deciles, quartiles, mean, and median at each school and grade for each year 1963-64 to 1966-67 for which data were available. These plots generally reflect the drop in achievement from 1964-65 to 1965-66 noted above. They also show no consistent relationship between the movements in the mean (or median) and the movements in the other statistics which would be expected if a significant trend factor were operating.

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Table 53. Pupil-to-teacher ratio, District 8 public schools.

School No.	1963-64	1964-65	1965-66	1966-67	Change (63-64 to 66-67)
10	24.9	25.0	23.2	23.6	-1.3
11	22.7	22.4	22.4	20.9	-1.8
12	25.5	25.3	25.5	24.2	-1.3
13	22.6	22.7	22.3	21.5	-1.1
14	24.2	25.0	24.7	21.5	-2.7
15	26.3	24.6	24.0	24.2	-2.1
16	28.0	25.6	25.2	23.7	-4.3
40	24.8	25.6	24.3	24.3	-0.5
43	24.8	25.4	23.0	22.6	-2.2
44	23.2	22.3	20.5	20.3	-2.9
45	25.0	22.8	22.4	22.8	-2.2
47	26.1	24.6	23.6	24.4	-1.7
71	19.3	19.3	17.7	19.7	+0.4
Non-Title I Schools					
64	25.8	24.4	22.8	21.9	-3.9
65	27.1	27.2	25.7	26.4	-0.7
66	23.5	22.6	22.4	22.2	-1.3
67	22.0	22.6	25.5	23.8	+1.8
68	23.0	22.8	23.0	23.2	+0.2
69	24.1	24.0	23.4	23.3	-0.8
72	—	—	22.9	25.4	—
73	26.2	25.1	24.1	23.7	-2.5
74	23.7	23.5	22.9	22.7	-1.0

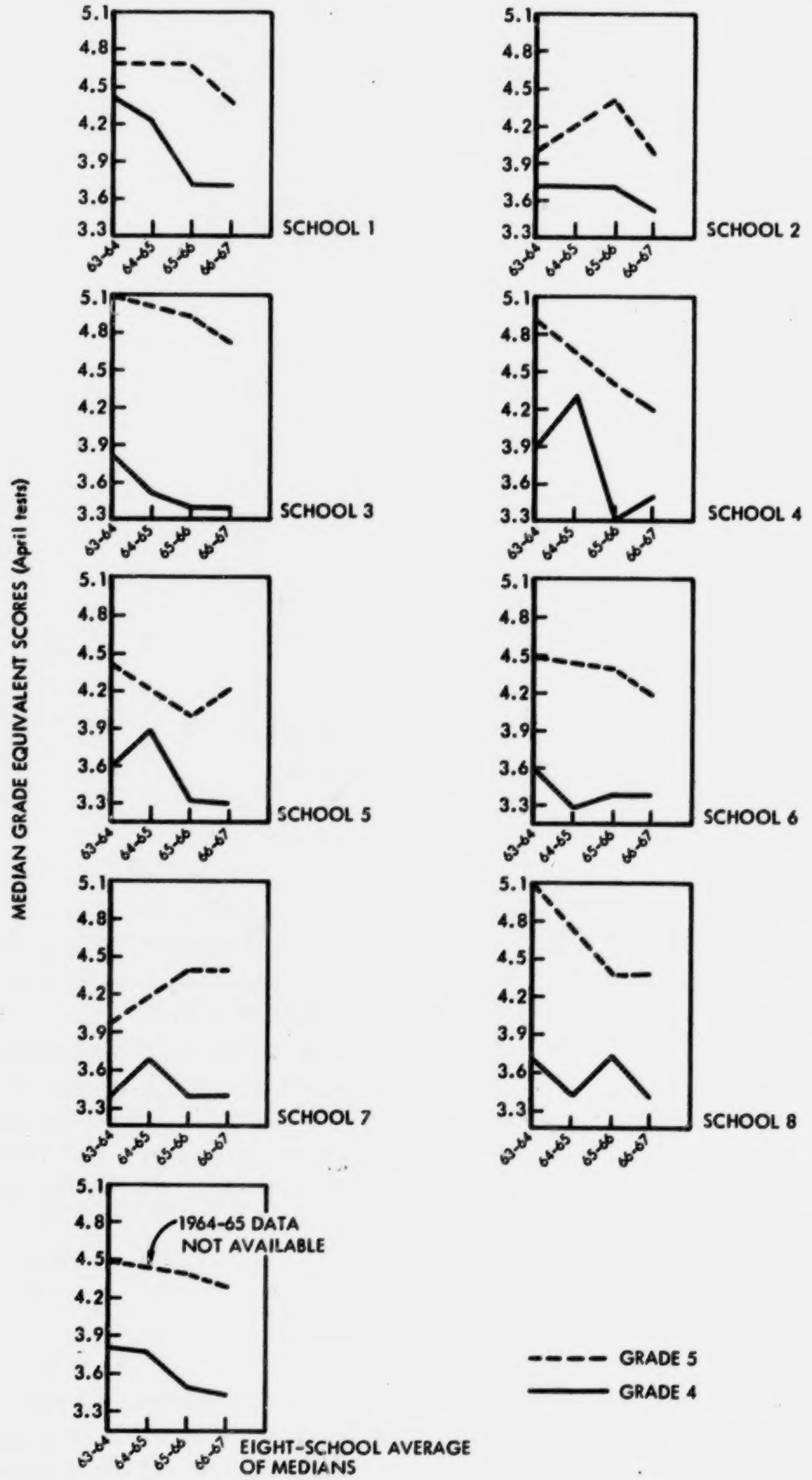

Figure 14. Median scores and median average in eight selected schools — District 8.

Table 54. Summary of changes in Title I schools from 1964-65 to 1965-66, by Grade—District 8.

Grade	Average Drop in Median (Grade Equivalents)	Number of Schools Observed[a]
4	0.25	8
5	0.08	8
6	0.04	23
7	0.07	8
8	0.26	8

Note:

[a] The same eight elementary schools for grades 4 and 5 are represented in Figure 14.

Although there is some evidence of a downward trend, it is not sufficient for concluding that a significant trend factor is operating in District 8 Title I schools. Most of the drop in the last few years was in one specific interval, 1964-65 to 1965-66. Evidence of this drop was mainly in grade-4 scores and the pattern was so uniform among schools that it is likely to reflect a change in the test or testing procedure rather than a decline in the actual achievement level of the pupils. Since longitudinal data were used in the evaluation of District-8 CE activities, further analysis of possible trends was not considered necessary.

F. DISTINGUISHING FEATURES OF SUCCESSFUL CE

The activity on reading improvement appeared to be much more successful than the activity which was oriented to reducing class size, even though the latter activity involved three times as much expenditure per pupil. The activity for reducing class size was, by design, oriented toward all academic skills, but there is no evidence of improvement in any of the academic skills measured on standard tests.

The activity on reading improvement in 1967-68 was only half as intense as in 1966-67 ($90 vs. $180 per pupil), but the results indicate that success was nearly as great. Although the evidence is not sufficient for drawing a firm conclusion on returns to scale, a hypothesis on this aspect is well worth exploring further.

There is no evidence that the wide dispersal of Title I funds among many pupils resulted in significant enhancement of achievement. However, since the average per-pupil expenditure for the majority of pupils in Title I schools was less than $10, it is unlikely that improvement, if any, would be detected.

The Reading Improvement Program

This program appears to have been quite successful. The reading classes were conducted daily and were an addition to the regular curriculum. Each reading class had a specially trained reading teacher and the services of a teaching assistant. The program reached about 793 students in grades 2 through 12, in twenty different schools (sixteen public and four nonpublic). These were the poorest achieving pupils in the respective schools except for the exclusion of trainable and educatable mentally retarded pupils. The total expenditure in 1966-67 of $140,833, primarily for 22 reading teachers' and 20 teaching assistants' salaries, averaged $177.59 per pupil. There was little variation about this average since there was little variation in size of special classes for reading improvement. All pupils were tested on the Durrell-Sullivan Test upon entry into the program and again, on an alternate form of the test, at the completion of the program.

The data available for evaluation consisted of pupil-school-test identification plus preachievement and postachievement scores. Table 55 summarizes the results of the program by grade in each of 16 public schools. For example, the first line of the table shows that 11 sixth graders at School 1 had an average grade equivalent score of 4.51 when they began the program and that their average advancement was 0.56 grade equivalents over a period of 31 weeks.

The columns labeled "E_1" and "E_2" are additional measures of progress, defined below, and "$\overline{E}_2$" is an average of E_2 for all pupils enrolled in this CE activity in each school. E_1 is the ratio of the growth rate (average change/average number of weeks) of the reading improvement students relative to the growth rate of a

Table 55. Summary of reading improvement program, selected District 8 public schools, 1966-67.

School No.	Grade	No. of Pupils	Average Prescore (grade equiv., fall 1966)	Comparison of Pretests and Posttests		E_1^b	E_2^b	$\bar{E}_2^c$
				Average No. Weeks Between Tests	Average Change in Achievement (grade equiv. units)			
1	6	11	4.51	31	0.56	0.72	0.991	0.84
	5	14	4.02	32	0.26	0.33	0.450	
	4	6	3.73	32	0.63	0.79	1.09	
	3	4	2.45	32	0.82	1.03	1.42	
2	6	12	4.05	31	1.07	1.38	1.91	2.14
	5	13	3.57	31	1.09	1.41	1.95	
	4	7	2.84	30	1.41	1.89	2.62	
	3	7	1.80	26	1.14	1.75	2.43	
3	6	11	4.03	17	0.14	0.32	0.45	1.08
	5	12	3.40	20	0.56	1.10	1.53	
	4	7	2.58	18	0.43	0.96	1.32	
4	6	13	5.45	23	0.84	1.43	1.98	1.83
	5	14	4.07	27	0.98	1.47	2.04	
	4	12	3.51	29	0.75	1.03	1.43	
5	6	10	4.98	28	0.93	1.33	1.84	1.81
	5	7	3.31	23	0.81	1.38	1.92	
	4	13	2.65	24	0.75	1.25	1.73	
	3	5	2.12	25	0.82	1.33	1.85	
6	6	17	3.99	35	1.08	1.23	1.71	1.54
	5	5	3.66	32	0.22	0.28	0.38	
	4	14	3.13	35	1.10	1.26	1.74	
8	6	4	4.55	29	0.22	0.30	0.420	1.24
	5	16	3.88	21	0.11	0.21	0.295	
	4	14	3.23	29	1.34	1.85	2.56	
9	6	11	4.22	31	1.40	1.78	2.47	1.99
	5	12	3.48	35	1.02	1.17	1.61	
	4	12	2.72	35	1.22	1.39	1.93	
10	9	12	6.31	23	2.81	4.95	6.86	5.62
	8	27	6.09	27	2.51	3.66	5.07	
11	8	14	5.51	30	0.56	0.75	1.03	1.21
	7	15	4.71	30	0.75	1.00	1.39	
12[d]	8	15	4.81	33	0.46	0.58	0.78	0.85
	7	19	5.86	33	0.54	0.66	0.91	
13	8	18	6.03	19	1.87	3.94	5.45	4.12
	7	16	5.00	19	0.90	1.89	2.62	
14	11	9	7.28	28	1.49	2.09	2.90	1.91
	10	22	6.94	21	0.58	1.08	1.50	
15[d]	10	21	6.30	27	1.28	1.90	2.62	2.62

Table 55. (continued)

School No.	Grade	No. of Pupils	Average Prescore (grade equiv., fall 1966)	Comparison of Pretests and Posttests		E_1^b	E_2^b	$\bar{E}_2^c$
				Average No. Weeks Between Tests	Average Change in Achievement (grade equiv. units)			
16	11	15	7.38	30	0.72	0.98	1.35	1.53
	10	23	6.50	30	0.90	1.19	1.65	
31	6	7	4.36	13	-0.10	-0.30	-0.39	1.57
	5	5	3.70	14	0.32	0.91	1.26	
	4	14	3.39	14	0.56	1.60	2.21	
	3	6	2.63	14	0.42	1.20	1.66	
	2	6	2.13	14	0.40	1.14	1.59	
Average (16 schools)				28	0.76	1.11	2.00	

Notes:

[a] Does not include nonpublic schools.

[b] E_1 = (average change/average no. weeks) ÷ average change for entire pupil population of 0.9 grade equivalent units per 36 weeks, whereas

E_2 = (average change/average no. weeks) ÷ TEMPO estimate of 0.65 grade equivalent units per 36 weeks average change for these pupils in the absence of CE.

[c] $\bar{E}_2$ = school mean for the E_2 statistic.

[d] These schools recorded change in achievement in terms of 12 months to the year but the data were transformed so as to be comparable to other schools.

norm-achieving student (0.9 grade equivalent per 36-week school year). Thus, an E_1 value of 1.0 indicates progress at a rate equal to that of a norm-achieving student. E_2 is a similar measure; however, it measures the growth of the reading improvement students relative to the growth that these specific students might be expected to make in the absence of the reading program (E_2 is discussed in more detail subsequently). It has been estimated, as shown below, that such students can be expected to advance about 0.65 grade equivalents per year. Values of E_2 exceeding 1.0 indicate progress greater than that which would be predicted without the reading program for pupils enrolled in this CE activity.

The average rate of change in grade-equivalent (E_1 in Table 55) was 1.11, which is greater than expected for the norm pupil. In only 11 of the 45 grade units analyzed was the rate of increase in achievement less than that expected for the norm pupil.

The mean values of $\overline{E}_2$ for all but two of the schools are greater than 1.0. Two of the schools (10 and 13) appear to have made remarkable progress. Thirty-six of the forty-five school-grade units analyzed have values for E_2 in excess of 1.0. The overall mean value for E_2 is 2.00. It should be noted that the same teacher taught all of the pupils in the program at a particular school. Therefore, variations among grade levels within a school cannot be attributed to differences in competence of teachers. Table 56, which provides a summary by grade level, shows no significant variations by grade, except possibly for grades 8 and 9, which are due to the very large values at schools 10 and 13.

Additional information on the reading improvement activity can be obtained from analysis of the 1967-68 data. Tables 57 and 58 show data for 1967-68. Again, the rate of progress during exposure to CE was impressive. The average rate of improvement was 1.35 times the expected rate for the norm-achieving pupil and 1.85 times TEMPO's best estimate for rate of response that specific pupils would have had in the absence of CE. The data in Table 58 show no obvious correlation between grade level and rate of improvement.

A comparison of the program and results in the two years is interesting. The program contained some significant differences between the two years; namely, no teaching assistants were employed in the latter year, and with only two exceptions, the elementary school pupils received only half as much instruction (the class met every other day instead of every day; three meetings in one week, and two meetings in alternate weeks). Table 59 compares this activity, the rate of progress, and the difference between elementary and secondary school pupils.

As in Table 55, the E_2 statistic shows the rate of progress during the reading improvement activity relative to TEMPO's best estimate of the rate of progress in the absence of CE. Although the 2.00 average relative rate of progress for all 492 pupils in 1966-67 was only slightly larger than the corresponding value of 1.85 for 1967-68, the cost per pupil in 1966-67 was approximately twice as large.

The difference between the two levels of intensity was not the same for the elementary and secondary pupils. Grades 7 through 11 did better in 1966-67 than in 1967-68 by a factor of 1.24(=2.90/2.33);

Table 56. Summary of Reading Improvement Program by grade, school year 1966-67 – District 8.

Grade	No. of Pupils	Average Prescore (grade equiv., fall 1966)[a]	Comparison of Pretests and Posttests		E_1[a]	E_2[a]
			Average No. Weeks Between Tests	Average Change in Achievement (grade equiv. units)[a]		
2	6	2.13	14	0.40	1.14	1.59
3	22	2.22	23.5	0.81	1.37	1.90
4	99	3.09	27.3	0.93	1.36	1.89
5	98	3.72	26.6	0.62	0.93	1.28
6	96	4.44	27.5	0.78	1.13	1.56
7	50	5.24	27.6	0.72	1.16	1.60
8	74	5.71	27.0	1.57	2.55	3.52
9	12	6.31	22.7	2.81	4.95	6.86
10	66	6.58	26.3	0.91	1.38	1.91
11	24	7.34	29.1	1.01	1.38	1.92

Note:

[a] E_1 = (average change/average No. weeks) ÷ average change for entire pupil population of 0.9 grade equivalent units per 36 weeks, whereas

E_2 = (average change/average No. weeks) ÷ TEMPO estimate of 0.65 grade equivalent units per 36 weeks average change for these pupils in the absence of CE.

Both values are weighted by number of pupils in each school.

grades 2 through 6 did better in 1966-67 by a factor of 1.20 (= 1.60/1.33). Even though in grades 7 through 11 the only difference in treatment for the 2 years was a teaching assistant, whereas in grades 2 through 6 the difference in treatment was a teaching assistant and about twice as much instruction, both factors are approximately the same.

APPENDIX 5

Table 57. Summary of Reading Improvement Program selected District 8 public schools, 1967-68.

School No.[a]	Grade	No. of Pupils	Average Prescore (grade equiv., fall 1966)	Comparison of Pretests and Posttests		E_1^b	E_2^b	$\bar{E}_2^c$
				Average No. Weeks Between Tests	Average Change in Achievement (grade equiv. units)			
1	3	18	2.24	30.44	0.91	1.20	1.66	1.82
	4	4	2.78	32.00	0.95	1.19	1.64	
	6	8	4.11	26.00	1.06	1.63	2.26	
2	3	18	2.10	34.67	0.92	1.06	1.47	1.51
	4	19	2.61	36.00	1.01	1.12	1.55	
3	3	17	2.15	33.41	0.64	0.77	1.06	1.03
	4	7	2.50	32.00	0.69	0.86	1.19	
	5	4	2.83	36.00	0.85	0.94	1.31	
	6	6	3.80	33.33	0.33	0.40	0.55	
4	3	13	2.60	34.77	0.59	0.68	0.94	1.30
	4	11	3.51	36.00	0.71	0.79	1.09	
	5	7	4.06	34.29	0.71	0.83	1.15	
	6	11	5.73	28.36	1.05	1.47	2.04	
5[d]	3	15	2.29	32.00	0.57	0.72	0.99	1.21
	4	15	3.27	32.00	0.83	1.03	1.43	
6	3	24	2.44	36.00	0.76	0.84	1.17	1.10
	4	5	2.82	32.80	0.46	0.56	0.78	
7	3	18	2.45	28.00	0.54	0.77	1.06	1.55
	4	12	3.18	28.00	0.94	1.34	1.86	
	5	6	3.48	28.00	1.20	1.71	2.37	
8	3	13	1.47	36.00	1.13	1.26	1.74	2.13
	4	24	2.43	36.00	1.52	1.69	2.34	
9	3	16	2.61	32.00	0.28	0.34	0.48	1.04
	4	18	3.22	32.00	0.89	1.11	1.54	
10	7	14	3.67	36.00	0.50	0.56	0.77	0.89
	8	18	5.09	36.00	0.65	0.72	1.00	
	9	8	5.20	36.00	0.55	0.61	0.85	
11	7	28	3.96	28.43	0.62	0.88	1.22	1.41
	8	9	5.77	32.89	1.20	1.46	2.02	
12	7	13	4.57	28.00	4.06	5.80	8.03	7.10
	8	21	5.52	26.48	3.11	4.70	6.51	
13	7	13	5.03	32.00	1.30	1.63	2.25	1.80
	8	18	5.92	32.00	0.86	1.07	1.48	

Table 57. (continued)

School No.[a]	Grade	No. of Pupils	Average Prescore (grade equiv., fall 1966)	Comparison of Pretests and Posttests		E_1^b	E_2^b	$\bar{E}_2^c$
				Average No. Weeks Between Tests	Average Change in Achievement (grade equiv. units)			
14	10	28	7.56	31.80	0.68	0.85	1.18	1.18
15	10	24	7.33	36.00	0.24	0.27	0.38	0.42
	11	1	6.10	36.00	1.00	1.0	1.38	
16	10	37	7.25	36.00	1.35	1.49	2.07	2.05
	11	3	6.26	36.00	1.67	1.85	2.56	
	12	2	5.55	26.00	0.40	0.61	0.85	
17	3	66	2.92	32.00	0.45	0.57	0.79	0.79
18	3	18	1.98	32.67	0.82	1.01	1.39	1.42
	4	6	2.97	29.33	0.55	0.75	1.04	
	6	11	4.03	30.55	0.93	1.21	1.68	
19	3	18	1.42	36.00	1.24	1.38	1.91	1.85
	4	18	2.21	36.00	1.16	1.29	1.79	
20	3	24	2.91	32.00	0.53	0.67	0.92	0.97
	4	27	3.75	29.78	0.50	0.67	0.87	
	6	11	4.96	31.27	0.75	0.95	1.32	
22	3	24	2.05	34.33	1.20	1.40	1.94	1.77
	4	12	3.01	31.00	0.80	1.03	1.43	
25[d]	3	12	2.11	32.00	0.76	0.95	1.31	1.38
	4	12	3.14	32.00	0.84	1.05	1.45	
28	6	12	4.05	16.00	0.38	0.96	1.33	2.11
	7	10	4.57	28.00	1.07	1.53	2.12	
	8	10	6.37	22.00	1.21	2.20	3.05	
31	3	18	2.39	30.22	0.96	1.26	1.75	1.87
	4	18	2.98	30.00	1.08	1.44	2.00	
39	3	17	2.65	31.06	0.01	0.01	0.02	0.16
	4	12	3.34	30.33	0.19	0.25	0.35	
40	7	33	4.68	32.61	1.09	1.34	1.85	1.95
	8	11	6.18	29.09	1.17	1.61	2.23	
41	9	16	6.96	36.00	0.90	1.00	1.39	1.46
	10	17	6.95	36.00	0.97	1.08	1.49	
	11	1	3.80	16.00	0.60	1.50	2.08	

Table 57. (continued)

School No.[a]	Grade	No. of Pupils	Average Prescore (grade equiv., fall 1966)	Comparison of Pretests and Posttests		E_1^b	E_2^b	$\bar{E}_2^c$
				Average No. Weeks Between Tests	Average Change in Achievement (grade equiv. units)			
43	7	24	4.45	34.67	1.57	1.81	2.51	2.48
	8	16	3.67	32.75	1.44	1.76	2.43	
44	7	32	4.08	33.25	3.29	3.95	5.48	5.48
45	7	32	4.16	36.00	1.48	1.64	2.27	1.89
	8	4	5.03	36.00	1.05	1.17	1.62	
	9	7	6.07	36.00	0.21	0.24	0.33	
47	10	40	6.68	33.70	2.13	2.53	3.50	3.53
	11	5	4.14	22.40	1.54	2.75	3.80	
	12	5	10.00	21.60	1.36	2.52	3.45	
Average (31 schools)		36	9.53	74.70	3.34	1.35	1.85	1.83

Notes:

[a] Does not include nonpublic schools.

[b] E_1 = (average change/average No. weeks) ÷ average change for entire pupil population of 0.9 grade equivalent units per 36 weeks, whereas

E_2 = (average change/average No. weeks) ÷ TEMPO estimate of 0.65 grade equivalent units per 36 weeks average change for these pupils in the absence of CE.

[c] $\bar{E}_2$ = school mean for the E_2 statistic.

[d] These schools recorded change in achievement in terms of 12 months to the year but the data were transformed so as to be comparable to other schools.

Table 58. Summary of Reading Improvement Program by grade, school year 1967-68 – District 8.

Grade	No. of Pupils	Average Prescore (grade equiv., fall 1966)[a]	Comparison of Pretests and Posttests		E_1[a]	E_2[a]
			Average No. Weeks Between Tests[a]	Average Change in Achievement (grade equiv. units)[a]		
3	349	2.39	32.7	0.69	0.84	1.16
4	220	2.97	32.5	0.87	1.07	1.38
5	17	3.56	32.5	0.92	1.13	1.56
6	59	4.51	27.0	0.76	1.13	1.56
7	199	4.31	32.6	1.66	2.04	2.82
8	107	5.39	30.7	1.45	1.89	2.62
9	31	6.30	36.0	0.65	0.73	1.01
10	146	7.09	34.6	1.21	1.40	1.93
11	10	4.81	27.2	1.43	2.10	2.90
12	7	8.73	23.0	1.45	1.97	2.71

Note:

[a] E_1 = (average change/average No. weeks) ÷ average change for entire pupil population of 0.9 grade equivalent units per 36 weeks, whereas

E_2 = (average change/average No. weeks) ÷ TEMPO estimate of 0.65 grade equivalent units per 36 weeks average change for these pupils in the absence of CE.

Both values are weighted by number of pupils in each school.

There is some indication that there is better response at the secondary than at the elementary level. In 1966-67, grades 7 through 11 did better than grades 2 through 6 by a factor of 1.81 (2.90/1.60); in 1967-68 grades 7 through 11 did better than grades 2 through 6 by a factor of 1.75 (2.33/1.33). Again, both factors are nearly the same, although in 1966-67 the treatment was the same for both groups whereas in 1967-68 the treatment differed.

These comparisons suggest the following hypotheses:

1. An every-other-day program in reading achievement is nearly as effective as a daily program. The marginal returns from increasing intensity in this specific activity are small beyond the level of the every-other-day program.
2. The pupils in the upper grades respond better than those in the lower grades to this activity.
3. Teaching assistants increased the effectiveness of this activity.

Since the four observations in Table 59 represent changes in all three factors — grade level, inclusion of teaching assistants, and number of classes per week — it is not possible to draw firm conclusions with respect to the above hypotheses.

Classes of Twenty

The activity known as "Classes of Twenty" accounted for a substantial expenditure (about $132,600) on a relatively small number of pupils (about 420). The $316 expenditure rate per pupil is nearly twice as large as that for the Reading Improvement activity. The stated objective of the activity was "to give pupils who are very low in achievement sufficient help so that they will change their attitudes toward themselves, the school, the need for individual effort, and life in general so that they will want to continue in school."* Pupils were selected on the basis of (1) their being two or more years below average in achievement, as measured by standardized reading test results, and (2) having potential for doing better school work, in the opinion of teachers and counselors. Class sizes were limited to 20, as the name implies.

There were six schools which conducted Classes of Twenty, but only three were included in this study. At two of the schools a student in the program attended Classes of Twenty for all academic subjects. At the other school a student would attend a Class of Twenty in one, or at most two, academic subjects and he would attend classes in other subjects with his regular class.

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*Reference 1, page 115.

Table 59. Comparison of reading improvement in 1966-67 and 1967-68 – District 8.

Grade	Academic Year 1967-68	Academic Year 1966-67
2-6	513 students	321 students
	$\overline{E}_2 = 1.33$	$\overline{E}_2 = 1.60$
	Treatment: Every other day, no teaching assistant	Treatment: Every day, with teaching assistant
7-11	553 students	171 students
	$\overline{E}_2 = 2.33$	$\overline{E}_2 = 2.90$
	Treatment: Every day, no teaching assistant	Treatment: Every day, with teaching assistant
Totals	31 schools[a]	16 schools
	1059 students	492 students
	$\overline{E}_2 = 1.85$	$\overline{E}_2 = 2.00$

Note:

[a] Does not include all of the schools which had a 1967-68 reading program. Several of the schools in the 1966-67 program were also in the 1967-68 program.

APPENDIX 5

Because of the stated broad objectives of this program it may not be appropriate to judge its success entirely by standardized tests. That is, a change in attitude might actually be achieved without a concomitant improvement in achievement test scores, especially after only 1 year of the program. Nevertheless, standardized test results were the only objective means readily available for evaluation.

The grade 7 and 8 test scores on each of the subtests of the Metropolitan Achievement Test were recorded for all pupils in Classes of Twenty as well as for pupils in a "control group" in each Class of Twenty school.* The latter groups consisted of all similarly retarded pupils (i. e., those whose seventh grade reading score was two or more years below norm) who were not in the Classes of Twenty or in the Reading Improvement Program. The differences between "pre" and "post" were computed and averaged over all the pupils in each group as shown in Table 60. Since the tests were 1 year apart, one achievement comparison is with the average change of 1.0 for the norm-achieving pupil, while another is provided by the control group. Table 60 shows that the non-Classes of Twenty control group (N-20) did better than Classes of Twenty control group (C-20) in 11 out of 13 cases. Thus, the Classes of Twenty students did not show up favorably when compared to the control group or when compared to the average for the total pupil population.

Another kind of comparison was possible due to the availability of arithmetic scores in three successive years — grades 6, 7, and 8 — where the grade 8 testing was done after about one year of participation in Classes of Twenty CE activity. The procedure followed was to compare the grade 7 to 8 growth of these pupils with their grade 6 to 7 growth. The necessary records were available for 30 pupils from school number 12. The results are summarized in Table 61. The average change in score, on the Arithmetic Computations subtest, in going from grade 6 to grade 7 was 0.003, practically zero; the average change in score in going from grade 7 to grade 8, for these same students, was 0.38. A statistical test indicates that such a difference in averages would be highly unlikely just by chance alone, if it is reasonable to assume that there is nothing inherently different about pupils' grade 6 to 7 growth versus their grade 7 to 8 growth. If the above assumption is reasonable

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*Testing was done in February of both years.

Table 60. Comparison of progress (as measured by average change in grade equivalent score from grade 7 to 8) by pupils in Classes of Twenty versus "Control Group" pupils.[a]

School No.	MAT Subtest	Reading		Language		Arith. Prob. Solving		Arith. Comp.		Science		Social Studies Information		Social Studies Study Skills	
		C-20[b]	N-20[b]	C-20	N-20	C-20	N-20	C-20	N-20	C-20	N-20	C-20	N-20	C-20	N-20
12	N^c			32	84	32	50	32	37	27	64	51		51	99
	$\overline{X}^d$			5.52	4.59	5.30	4.79	5.37	5.36	5.10	5.10	5.48		5.17	4.49
	Δ^e			0.82	0.79	0.59	1.08	0.38	0.52	0.50	1.08	0.86		1.01	1.30
43	N	17	43			18	44	17	43	14		16			
	$\overline{X}$	3.97	4.39			5.08	5.50	5.81	5.53	4.94		4.66			
	Δ	0.64	0.47			0.37	0.09	0.37	0.23	0.00		0.23			
13	N	12	42			11	42	1	39	9	35	9	35		
	$\overline{X}$	3.77	4.60			5.33	5.92	5.72	6.03	5.01	5.54	4.31	5.54		
	Δ	0.71	1.02			0.32	0.39	0.05	0.14	0.35	0.75	0.33	0.75		

Notes:

[a] The "non-Classes of Twenty" group was defined in each case as all pupils in the class who were (1) not in a "Class of Twenty," and (2) two or more years behind grade level.

[b] C-20 denotes Classes of Twenty pupils; N-20 denotes pupils not in Classes of Twenty, but who had approximately the same preachievement level as those in Classes of Twenty.

[c] N = No. of pupils assigned to "Classes of Twenty" and "non-Classes of Twenty" for which grade 7 and 8 test results are available.

[d] $\overline{X}$ = Average grade 7 score, in grade equivalents. Test date February.

[e] Δ = Average change in score, from grade 7 to 8. Test date February.

Table 61. Comparison of changes in arithmetic scores before and after Classes of Twenty - School 12 [a] – District 8.

	Change in Grade 6-7 Scores	Change in Grade 7–8 Scores
Arithmetic Computation Test		
Mean	0.003	0.38
Variance	0.430	0.429
Standard Deviation	0.655	0.655
Arithmetic Problem Solving Test		
Mean	0.33	0.59
Variance	1.274	1.501
Standard Deviation	1.129	1.225

Note:

[a] Sample size 30 pupils, all tests.

then the result might indicate that these pupils did better than would have been expected without the Class of Twenty. The second subtest—Arithmetic Problem Solving—also showed larger improvement in grade 7 (a mean of 0.59 versus 0.33) but the difference is not statistically significant, partly because of the larger variability of the scores on this test.

In our best judgment there is not sufficient evidence to conclude that the Classes of Twenty activity resulted in significant improvement. The evidence from the 30 pupils who improved more in grade 7 while in the activity than they did in grade 6 while not in the activity is not reliable. The average increase of only 0.003 in grade 6 suggests that a very critical review of this number as a comparative statistic is in order.

We suggest that more analysis of activities such as Classes of Twenty, which essentially reduce pupil-to-teacher ratios, is warranted. It is difficult to believe that lower ratios are not beneficial. However, there could be one or more factors operating negatively at the same time as class size is reduced, and these factors could counteract the positive contribution of a lower pupil-to-teacher ratio.

Estimate of Rate of Increase in Achievement for Target Pupils in Absence of CE

The justification for assuming a growth rate of 0.65 grade equivalent for 36 weeks in target pupils in the absence of CE is that when a straight line is fitted by least-squares to the average prescore (second column, Table 56), by grade level, as shown in Figure 15, the line has a slope of 0.62. The fit of this line to the observations is good. Thus, the interpretation given to this observation is that pupils who are entered in the Reading Improvement Program progress, on the average, at the rate of approximately 0.65 grade equivalent per year. Corresponding data from the 1967-68 reading program were available for comparison. Figure 16 contains the same kind of information in Figure 15 but represents different pupils in a different year. Once again, the best fitting straight line has a slope approximately equal to 0. 65.

Additional justification of our estimate of average rate of improvement of 0.65 grade equivalent per year was provided by the following process: a random sample of 219 seventh graders in school year 1965-66 at school 12 was selected. These same pupils were identified in 1966-67 as ninth graders, and their reading scores for the 2 years were recorded. The group was then split into two groups, based upon their grade 7 scores: the low group, consisting of those below the median grade 7 score, and the high group, consisting of those at or above the median. The growth in reading score from grade 7 to grade 8 was then computed for each member of both groups. The average growth for the high group was 0.998, while the average growth for the low group was 0.644.

G. CHARACTERISTICS ASSOCIATED WITH SUCCESS OF CE

The analysis of CE education programs in District 8 did not reveal any pupil or school characteristics that were highly correlated with success in CE. There were, however, very few data for conducting such an analysis. The Classes of Twenty activity did not show quantitative evidence of success so no correlation analysis of possible relations between state variables and change in achievement was carried out. The only pupil and school variables for which data were available in the Reading Improvement Program were grade level, percentage Negro in the school, and initial achievement level of pupils enrolled in this CE activity.

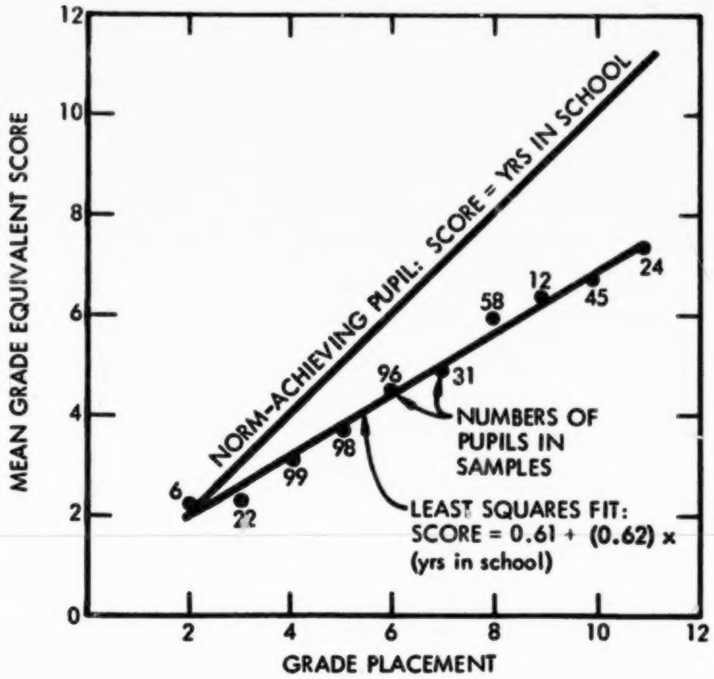

Figure 15. Rate of increase in achievement of pupils prior to enrollment in the Reading Improvement Program in fall 1966—District 8.

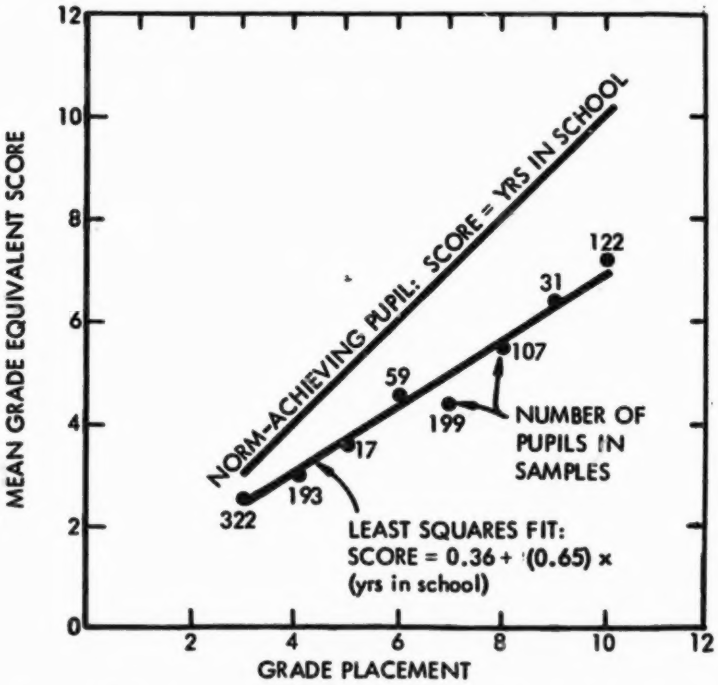

Figure 16. Rate of increase in achievement of pupils prior to enrollment in the Reading Improvement Program in fall 1967—District 8.

The analysis of the Reading Improvement activity shows large differences in average response among the participating schools (see the $\overline{E}_2$ measure in Table 55). Analysis of available data was carried out to determine if there were any pupil or school characteristics that were correlated with and could explain observed differences in the effects of this activity. There is no apparent relationship between racial composition of a school and the average rate of achievement (data on the race of specific pupils enrolled in CE were not available).

There was some evidence in the 1966-67 results that pupils in grades 7 through 12 did better than those in grades 2 through 6. However, this cannot be validated statistically due to the presence of other uncontrolled variables which may have produced the differences. The results for 1967-68 do not show any significant patterns between elementary and secondary pupils. Large differences in achievement were observed among the grade levels within some schools in both years. All grade levels within a school had the same teacher, so the variation cannot be attributed to differing teacher abilities.

The only remaining state variable studied was the initial reading level of the pupils. Figure 17 is a scatter diagram of the pretest and posttest scores of the 95 grade 6 pupils in the Reading Improvement program in 1966-67. The correlation of 0.76 indicates that their scores in the spring of the academic year (after nearly a year of CE in reading) were fairly highly correlated with their initial scores. The least-squares fit of an equation for predicting their postscores on the basis of their prescores indicates the average change is only slightly negatively correlated with initial level. The value of 0.94 for the regression coefficient should be 1.0 if there is no correlation between change and initial level. Figure 18 is a graph of initial achievement level and changes in achievement for the same group of pupils. The correlation of -0.08 is neither statistically significant nor large enough to be of interest if it were statistically significant.*

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*When adjustment is made for the so-called regression effect due to error in measurement, our best estimate is that the true correlation coefficient is near zero. This point is discussed further in Appendix 6.

APPENDIX 5

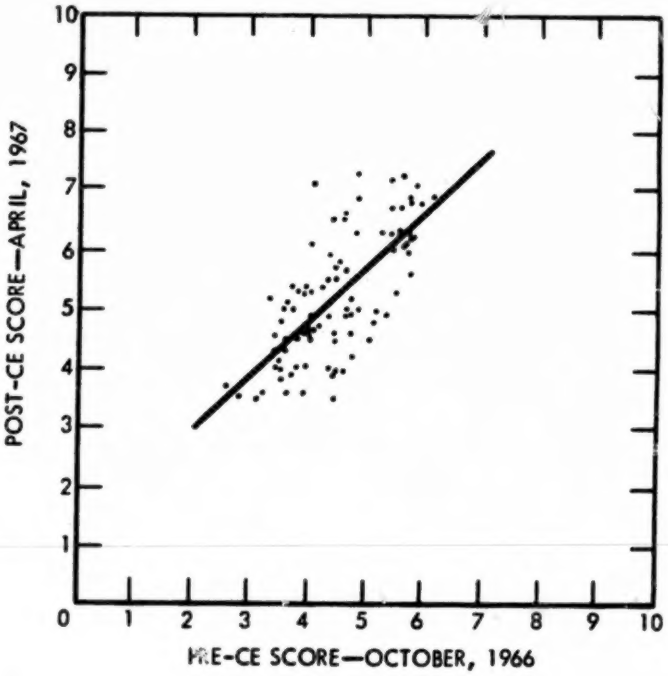

Figure 17. Grade equivalent scores, pre- and post-CE for 95 grade 6 pupils in nine schools – District 8.

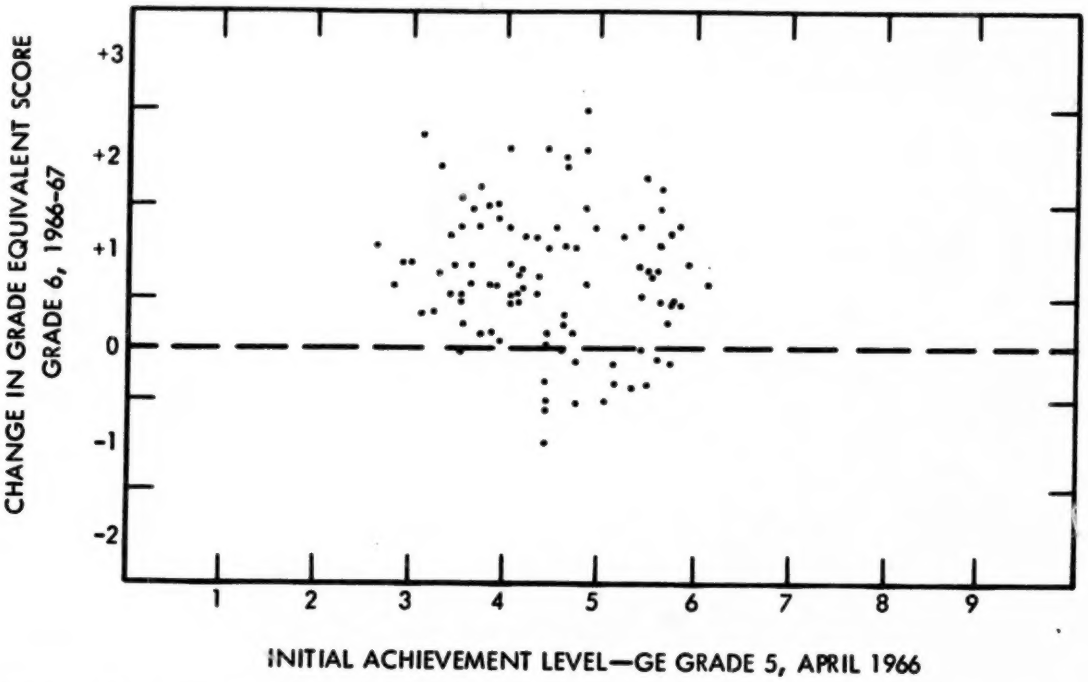

Figure 18. Change in achievement versus initial achievement level for 95 grade 6 pupils in nine schools – District 8.

APPENDIX 6

DESCRIPTION OF ANALYTICAL METHODS

A. CORRELATIONS BETWEEN PRESCORES AND POSTSCORES

Errors of measurement produce a negative correlation between initial achievement level and change in achievement as measured, even if there is no true correlation. Similarly, any true correlation will be obscured in the analysis of observed data.

Let the observed initial value, x, represent the sum of the true value, x*, and an error of measurement, e_1.

$$x = x^* + e_1 \tag{6-1}$$

Similarly, let the measured final value, z, represent the sum of the true initial value, x^*, a true gain, g, and an error of measurement e_2.

$$z = x^* + g + e_2 \tag{6-2}$$

The observed difference between the two, $y = z - x$, becomes:

$$y = g + e_2 - e_1 \tag{6-3}$$

The reason for the apparent negative correlation between x and y, even if x* and g are uncorrelated, is the presence of "$+e_1$" in the expression for x and "$-e_1$" in the expression for y.

Peters and Van Voorhis (Reference 31, p. 460) state that the magnitude of the correlation due simply to unreliability of measurement is:

$$r_{x,y} = - \sqrt{1/2\ (1-r_x)} \tag{6-4}$$

where r_x is the reliability of the instrument used in measuring x and z. This means that if there is no reliability to the instrument, a correlation of -0.7 will be found between initial level and observed gain and that as reliability increases the correlation due to measurement error alone will drop.

Thomson (Reference 44, pp. 321-324) provided the following formula to correct for errors of measurement:

$$r_{x^*, g} = \frac{r_{xy} + \frac{\sigma_x}{\sigma_y}(1-r_x)}{\frac{1}{\sigma_y}\sqrt{r_x[\sigma_y^2 - \sigma_x^2(1-r_x) - \sigma_z^2(1-r_z)]}} \qquad (6\text{-}5)$$

where

$$r_x = 1.0 - \frac{\sigma_{e_1}^2}{\sigma_x^2} \qquad (6\text{-}6)$$

$$r_z = 1.0 - \frac{\sigma_{e_2}^2}{\sigma_z^2} \quad . \qquad (6\text{-}7)$$

with r_z comparable to r_x as defined for Equation 6-4. The Thomson formula requires estimates of the reliability of the measuring instrument and measures of the variance of initial value, x; final value, z; and gain, y. At the time of our study, there was no measure of the reliability of the test instrument for measuring achievement of school grade units. In spite of the lack of such estimates, it was desired to see how the measured correlation between initial achievement level and change in achievement of pupils in CE for District 8 would be altered for various sizes of error in measurement.

The ratios of variances among the 95 pupils shown in Figures 17 and 18 were approximately

$$\frac{\sigma^2 \text{ (pre)}}{\sigma^2 \text{ (post)}} = 1. \tag{6-8}$$

$$\frac{\sigma^2 \text{ (post-pre)}}{\sigma^2 \text{ (post)}} = 0.5 \tag{6-9}$$

If the reliability of measurement in the prescore were 0.92 the true correlation would be zero. If the reliability of the measures pre and post as well as the change were only 0.8 the true coefficient would be

$$\begin{aligned} r_{x^*, g} &= \frac{-0.08 + 0.20}{\sqrt{0.8\ (1-0.8) - 0.5\ (1-0.8)}} \\ &= \frac{0.12}{\sqrt{0.56}} \\ &= 0.16 \end{aligned} \tag{6-10}$$

Any reliability for all three measures greater than 0.92 would yield a true correlation of between zero and the observed value of -0.08. Based on the variation in prescores and postscores TEMPO feels that a reliability of about 0.8 to 0.9 in this instance is reasonable, so the statement that the true correlation is very near zero is appropriate.

B. VARIANCE OF WEIGHTED AVERAGES

The formula for the variance of a simple average where each observation is given equal weight is

$$V = \sum_{i=1}^{n} \frac{[x_i - \bar{x}]^2}{n - 1} , \qquad (6\text{-}11)$$

where n is the number of observations on x_i.

The estimated variance for a weighted average such as

$$\bar{x} = \sum_{i=1}^{m} b_i x_i \qquad (6\text{-}12)$$

is given by the formula

$$V = \sum_{i=1}^{n} [b_i]^2 \sigma^2(x_i) . \qquad (6\text{-}13)$$

In this study the x_i is a parameter of a distribution of scores from m_i pupils.

The variance $\sigma^2(x_i)$ can be represented as

$$\sigma^2(x_i) = \frac{\sigma^2}{m_i} , \qquad (6\text{-}14)$$

where m_i is the number of pupils and σ^2 is a constant for all observations on the n sets of pupils. The b_i and m_i are known and it is only necessary to estimate σ^2 in order to use Equation 6-13.

We know that each value of

$$m_i [x_i - \bar{x}]^2 \qquad (6\text{-}15)$$

is an estimate of σ^2 . Therefore the best estimate of σ^2 is

$$\hat{\sigma}^2 = \sum_{i=1}^{n} \frac{m_i [x_i - \bar{x}]^2}{n} \qquad (6\text{-}16)$$

where n is the number of observations of sets on pupils.

The standard errors reported for weighted average results in this report were computed by substituting the value of $\hat{\sigma}^2$ from Equation 6-16 into Equation 6-14 and substituting the values from Equation 6-14 into Equation 6-13.

C. REGRESSION MODELS

There are several so-called state variables that warrant investigation. They represent characteristics of the student, the school, or the community that could conceivably affect the learning environment, and therefore influence the achievement levels obtained by the students being exposed to CE programs. The effect of any one of these state variables may differ depending on the values of the variables in a given circumstance. Moreover, simultaneous changing of two or more state variables may make it difficult to determine effects and interactions from nonexperimental data. As a result, one approach was to analyze the observed data on a multivariate basis so that the estimation of the effect of a particular variable would automatically include adjustments for the effect of changes in other variables. For this reason a multiple regression analysis was undertaken utilizing the four models described subsequently.

In addition to the state variables there are two basic expenditure variables that could affect change in achievement. These are expenditures for CE activities and expenditures for regular programs. For each basic variable there are several alternative measures such as total versus per-pupil, absolute amount versus fractional change, and CE and regular separate versus total of the two. The four regression models use change in CE and regular expenditures separately as well as fractional change in the total of the two types. In all cases the measures are in terms of change in per-pupil expenditures between "pre" and "post" pupils.

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Four basic forms of the equation for explaining changes in achievement were postulated. The first was without a constant but with a fairly large number of explanatory variables.

$$(\Delta ach) = a_1 (M_i - \overline{M}) + a_2 (\overline{X}_i - \overline{\overline{X}}) + a_3 (\Delta att)_i + a_4 (\Delta \$R)_i$$

$$+ a_5 (\Delta \$CE)_i + a_6 (\Delta neg)_i \qquad (6\text{-}17)$$

The symbols for this and the other equations are:

$(\Delta ach)_i$ = Change in achievement without specifying the specific measure ($\Delta\overline{X}$, ΔD_1, ΔQ_1, or ΔQ_3)

M_i = Mobility rate for the i^{th} observation

$\overline{M}$ = Average mobility rate for all sample observations in a a district

$\overline{X}_i$ = Mean preachievement level for the i^{th} observation

$\overline{\overline{X}}$ = Average of mean preachievement levels for all sample observations in a district

Δatt_i = Change in attendance rate in the school in which the i^{th} observation (grade) is located

$\Delta \$R$ = Difference in per-pupil expenditures between the year preceding the pre test for the pupils taking this test and the year preceding the post test for the pupils taking the post test.

$\Delta \$CE$ = Difference in per-pupil expenditures for CE between the year preceding the pre test for pupils taking this test and the year preceding the post test for the pupils taking the post test

$(\Delta neg)_i$ = Difference between percent Negro in the school in which the i^{th} observation (grade) is located

$\$F = \frac{\Delta\$CE + \Delta\$R}{(\$CE + \$R) \text{ pre year}}$ = proportional increase in total per-pupil expenditures.

$\Delta\overline{X}$ = Change in the mean reading achievement level measured in Standard T-scores

ΔD_1 = Change in lowest decile reading achievement level measured in Standard T-scores

ΔQ_1 = Change in the lowest quartile reading achievement level measured in Standard T-scores

ΔQ_3 = Change in the upper quartile reading achievement level measured in Standard T-scores

Because a constant term is not included in Equation 6-17 the first two variables are measured around the district mean. Otherwise, the equation would imply that Δach could be zero only where mobility rate and the mean preachievement level were zero.

The second model has no constant, fewer variables, and the change in per-pupil expenditures are measured in terms of a proportional change rather than an absolute amount.

$$(\Delta ach) = a_1 (M_i - \overline{M}) + a_2 (\overline{X}_i - \overline{\overline{X}}) + a_3 (\$F) + a_4 (\Delta neg) \qquad (6\text{-}18)$$

Models 3 and 4 are similar to 1 and 2, except a constant term is included:

$$(\Delta ach)_i = a_0 + a_1 (M_i - \overline{M}) + a_2 (\overline{X}_i - \overline{\overline{X}}) + a_3 (\Delta att)$$

$$+ a_4 (\Delta\$R) + a_5 (\Delta\$CE) + a_6 (\Delta neg) \qquad (6\text{-}19)$$

$$(\Delta ach)_i = a_0 + a_1 M_i + a_2 \overline{X}_i + a_3 (\$F) + a_4 (\Delta neg) \qquad (6\text{-}20)$$

Models 1 and 3 were estimated using each of $\Delta\overline{X}$, ΔD_1, and ΔQ_1 as dependent variables. Models 2 and 4 were estimated using only $\Delta\overline{X}$ and ΔD_1 as dependent variables.

D. FIXED-GRADE AND LONGITUDINAL APPROACHES

Many school districts follow a policy of giving achievement tests every year, but including only a few grades (e.g., the second, fifth, seventh, and twelfth grades). This means that there are generally more data available for the "fixed-grade" than for the "longitudinal" approach.

In the fixed-grade approach the distribution of pupil test scores for a specific grade in a school in 1 year is compared to the distribution of scores for corresponding pupils in the same grade and school in a different year. Since two different groups of pupils are involved, the comparisons are made in terms of one or more parameters of the distributions such as the mean, lowest decile, lower quartile, highest decile, and upper quartile. For example, in analysis of District 13 in this study, the mean and lowest decile in the distribution of test scores for grade 6 in 1966-67 (after exposure to CE) were compared to the mean and lowest decile in the distribution of test scores for grade 6 in 1965-66 (before CE).

In the longitudinal approach, a comparison is made between test scores for the same pupil at different points in his schooling. In analysis of the reading CE for pupils in District 8, for example, we compared the achievement level of Pupils in October 1966 (prior to CE) with their achievement level in May 1967. In order to evaluate the effect of CE, it is necessary to develop an estimate of what the increase in achievement level between October 1966 and May 1967 would have been in the absence of CE. The procedures used in District 8 are spelled out in Section F, Appendix 5. In the fixed-grade approach the two tests are usually given at the same time in each school year and a direct comparison can be made between tests in two different years.

Some school districts, such as District 8 in this study, have given special tests for use in evaluation of CE. As pointed out in Section H of Appendix 5, it is usually possible to make a better evaluation of CE if longitudinal data are available.

APPENDIX 7

DESCRIPTION OF VARIABLES

Because school districts vary in their administrative procedures and classifications, identical forms of information for all districts could not be obtained. There was, therefore, some variation in the types of material included under any particular definition. For example, total Title I funds may be based upon budgeted amounts or expenditures; mobility may be calculated during just the academic year or for a calendar year; etc. The definitions which follow represent the kinds of information we desired to obtain, and the figures used in this report should be interpreted as approximations which may vary somewhat among districts.

Variables	Description
District Title I ADM	The average daily membership of all schools (public and parochial) in the district receiving Title I funds. Usually this figure was obtained from application forms for Title I.
District Total Title I $ 1965-66	Expenditures (or budget) for Title I from February through August 1966.
District Total Title I $ 1966-67	Expenditures (or budget) for Title I from September 1966 through May 1967.
Grade	The school system classification of grade used for interpreting achievement results. Some nongraded classes with their appropriate grade levels were included but most special classes for mentally retarded were excluded.

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Variables	Description
% Negro 1965-66 % Negro 1966-67	The percentage of the students in a school identified as Negro in the districts' racial census. In cases where no formal census was done, estimates by district personnel were used.
% Spanish-speaking 1965-66 % Spanish-speaking 1966-67	District census estimates of the percent of the school population which comes from families where the primary language in the home is Spanish and for which it is reasonable to assume that school performance is hampered by an inadequate knowledge of English.
Mean Achievement Test Score - pre	The Mean Standard T-score in the reading subtest or composite achievement test by a specific grade at a particular school in academic year 1965-66.
Mean Achievement Test Score - post	As above for academic year 1966-67.
Change in Mean Achievement Test Score	Mean Achievement Test Score post minus Mean Achievement Test score pre.
Change in 1st decile, 1st quartile, and 3rd quartile	As above, for the respective points in the achievement test score distributions.
Sample Size 1965-66 Sample Size 1966-67	The number of pupils in a grade at a given school for whom achievement test data were obtained in 1965-66 (pre) and 1966-67 (post).
Attendance Rate (ADA/ADM)	Average Daily Attendance (pupil days attended divided by number of days school is in session) divided by ADM.
Change in Attendance Rate	Attendance rate in 1966-67 minus attendance rate in 1965-66.

Variables	Description
Test Date	Month and year achievement tests were administered to a given grade.
School ADM; Grade ADM	The Average Daily Membership (1965-66); as defined by the Office of Education (Reference 11); aggregate days membership divided by number of days school is in session. In some cases enrollment figures were substituted.
School Mobility	The sum of (a) total number of students entering the school after formal opening of the school years, and (b) total number of students leaving the school during the school year, the sum then divided by the school ADM. (If information required for this definition was not available, substitute measures were used.)
Poverty Index	A ranking of Low (1), Medium (2), or High (3) to indicate how each school compares to other Title I schools in a school district. (High means greatest degree of poverty.)
Average Title I Dollars per Pupil	District total Title I dollars 1965-66 plus K times (District Total Title I Dollars 1966-67) divided by District Title I ADM, where K is the fraction of the 1966-67 academic year that elapsed by the 1966-67 test date for that grade.
Weighted Averages	The observed values of changes in the means (ΔX), the 1st deciles (ΔD_1), and the quartiles (ΔQ) are weighted by the average number of pupils in the pre and post year.

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$$\text{weighted average} = \sum_{i=1}^{n} \frac{(m_1 + m_2)_i}{\sum_{i=1}^{n} (m_1 + m_2)_i} [\text{change in achievement}]_i$$

where m_1 and m_2 are the number of pupils in 1965-66 and 1966-67 respectively (in the i^{th} observation). The sum of the weights add to one.

Per-pupil expenditures - See Appendix 6 for definitions.

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ABSTRACT

This report presents the results from analysis of Compensatory Education (CE) in 11 school districts across the country. Data were obtained on amount and type of CE and on achievement scores of pupils participating in CE during the first two years (1965-66 and 1966-67) of Title I of the Elementary and Secondary Education Act of 1965.

The objectives of the study were to provide tentative answers to the following questions: 1) Has CE resulted in significant improvement in reading achievement level? 2) Which types of CE are successful? 3) What pupil-school-environmental factors are correlated with change in achievement? Results indicate enhancement of achievement as a result of CE among the pupils at the lower achievement levels in their grades. Concentrated CE activities for reading appear to be most successful. Initial achievement level and racial composition are two variables which were found to be correlated with changes in achievement.